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Government of Saskatchewan

Annual Report 1981-82

Saskatchewan Environment

Annual Report
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1981-82

Neal Hardy
Minister

Hugo Maliepaard
Acting Deputy Minister

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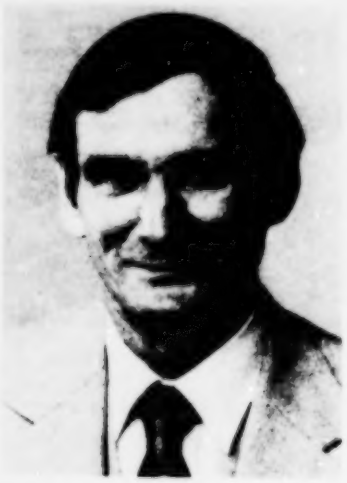


His Honour
C. Irwin McIntosh
Lieutenant Governor
Province of Saskatchewan

Sir:

I have the honour to transmit the annual report of Saskatchewan Environment for the period commencing April 1, 1981 and ending March 31, 1982.

Yours sincerely,

Neal Hardy

Neal Hardy
Minister

Honourable Neal Hardy
Minister
Saskatchewan Environment

Sir:

I have the honour to submit the annual report for Saskatchewan Environment for the year ending March 31, 1982. During the year public participation programs and department infrastructures were expanded to enhance the department's mandate to protect and manage the environment.

Regulations on pollution in the mineral industry were passed under The Department of The Environment Act to facilitate the transfer of this responsibility from the Department of Mineral Resources to Saskatchewan Environment.

As well as administering the impact assessment and review process for development proposals under The Environmental Assessment Act the environmental assessment secretariat completed guidelines to help mitigate the environmental impacts of road development in rural areas, and to encourage the heavy oil industry to gather environmental data during heavy oil pilot projects. Guidelines for the development and reclamation of sand and gravel pits, and for environmental protection during mineral exploration in northern Saskatchewan were being prepared.

During the year a mines waste research secretariat was established to initiate and co-ordinate research into uranium and potash waste management. Eight research projects were undertaken to investigate two abandoned uranium mining/milling sites in northern Saskatchewan, and a potash waste research program was developed.

The department's mandate to manage the province's water resources was enhanced with the establishment of a drainage control division under the water rights branch. This division administers The Drainage Control Act and Regulations; regional offices were opened in Tisdale and Fort Qu'Appelle to facilitate the process.

The land protection branch was expanded to incorporate a waste management division and a spill response section. A series of educational workshops were held throughout the province to explain the program and a field manual to assist prompt spill response is being prepared.

A major public participation program was initiated to receive input into Gulf Minerals' proposed uranium mine expansion at Collins Bay near Wollaston lake as part of the environmental assessment process.

Almost 100 delegates representing various government, industry and non-government organizations attended a hazardous waste management symposium co-sponsored by the department and the Saskatchewan associations of urban and rural municipalities. Recommendations received from this workshop will be used to develop a long-term strategy for hazardous waste management in the province.

I wish to recognize the hard work and dedication of department staff and also want to acknowledge the excellent co-operation and assistance of other federal, provincial and municipal government departments.

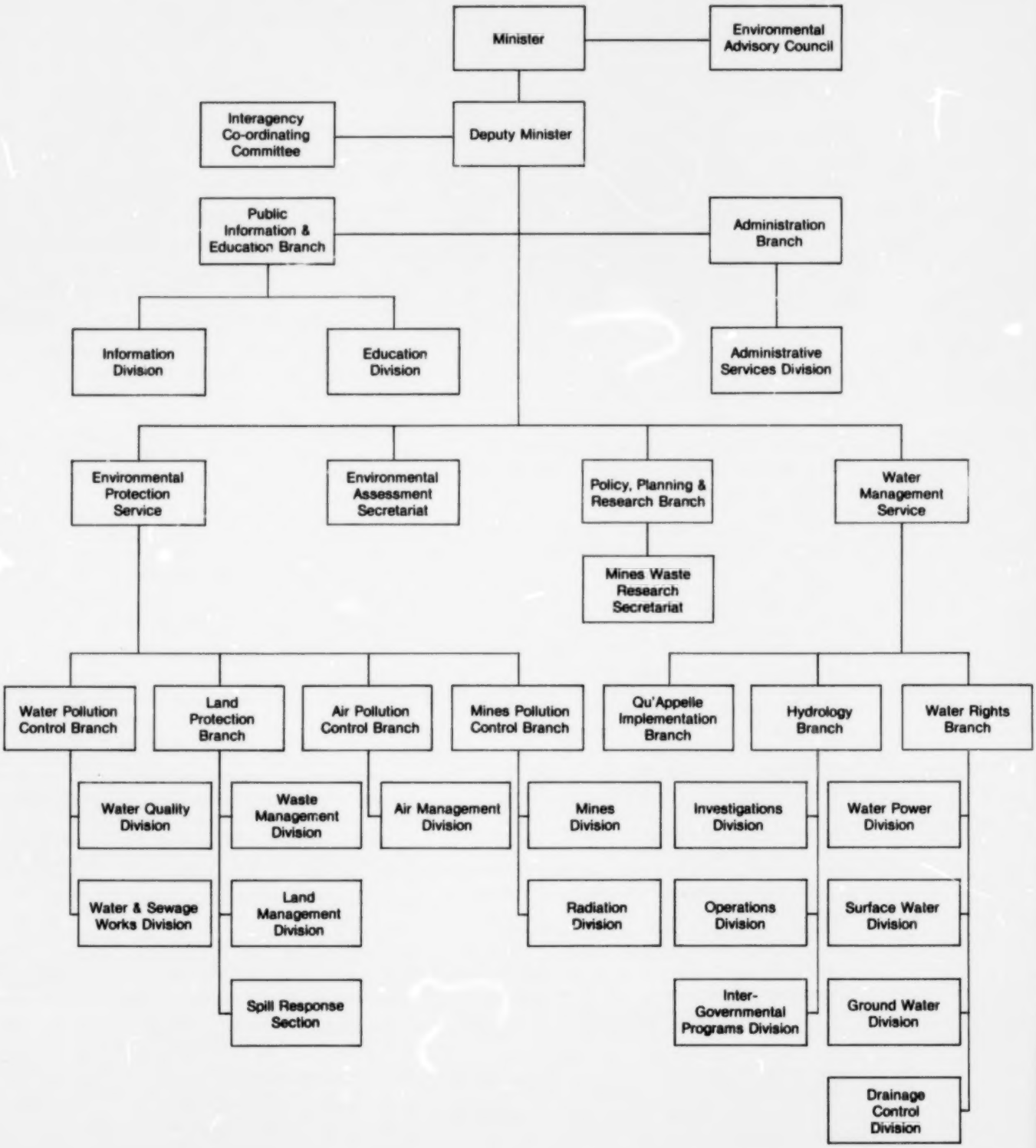
It is my belief that the department, over the past year, has contributed significantly to ensuring a continued high quality of environmental protection. This is reflected in the following annual report.

Your sincerely,

H. S. Maliepaard

H. S. Maliepaard
Acting Deputy Minister

Organizational Chart



Environmental Protection Service

G. W. Howard, Executive Director

L. J. Lechner, Director
Air Pollution Control Branch

D. A. Fast, Acting Director
Water Pollution Control Branch

A. Dimitrijevic, Acting Director
Land Protection Branch

R. R. Sentis, Director
Mines Pollution Control Branch

Environmental protection service

Introduction

Protection of Saskatchewan's environment is a complex task and is the responsibility of all levels of government, industry and the public. Through four branches, the environmental protection service has the responsibility of:

- establishing environmental quality objectives;
- establishing emission or ambient standards;
- licensing treatment and pollution control works;
- monitoring emissions and their impact;
- enforcing standards;
- requiring improvements where necessary.

Legislation

The department is authorized to carry out the above responsibilities under The Department of the Environment Act, The Air Pollution Control Act, The Water Resources Management Act and The Litter Control Act.

Interagency activities

The department works with several other departments to ensure the protection of the province's environment. Some examples include:

- Saskatchewan Agriculture regulates intensive livestock operations;
- Saskatchewan Mineral Resources regulates oil and gas development;
- Saskatchewan Health regulates landfill sites and cottage wastes and provides laboratory services. Public health inspectors inspect water and sewage treatment facilities and report their findings to Saskatchewan Environment for any required follow-up;
- Saskatchewan Urban Affairs provides grants for water and sewage works;
- Officers of Northern Saskatchewan and Saskatchewan Tourism and Renewable Resources make extensive use of The Litter Control Act.

Other controls

The owner or operator of pollution control or water works is required to carry out monitoring programs and report findings to Saskatchewan Environment. Licences to operate pollution control works are issued for a fixed term of up to five years. This procedure enables a periodic review of the terms and conditions in the licence before the licence can be renewed.

Coordination

To ensure that a coordinated approach to environmental pollution concerns is maintained, the service holds regular meetings of its four branches. In addition, there is extensive contact with municipal governments, federal government agencies and provincial agencies.

Air pollution control branch

- maintains a network of ambient air monitoring stations in urban centres;
- issues operating permits to industries which meet air pollution control standards;
- investigates air pollution complaints;
- carries out special studies into suspected problem areas;
- provides technical assistance and information on request;
- drafts guidelines to assist industries in obtaining permits to operate;
- reviews development proposals and environmental impact studies received from the environmental assessment secretariat.

Air management division

Urban air monitoring program

The provincial urban air monitoring program operated in all twelve Saskatchewan cities during the fiscal year. Twenty-six monitors were used to record data in this network. The addition of a sulphur dioxide monitor in Lloydminster and a high volume sampler in Melfort were the only changes in the program. Table 1 indicates the types of monitors installed at each station.

Fifteen high volume air samplers collected data on suspended particulate levels in Saskatchewan. The results obtained over the past 10 years indicate that particulate levels are generally decreasing or remaining constant. The annual provincial standard of 70 micrograms per cubic metre was exceeded in Prince Albert and Swift Current in 1981.

Four sulphur dioxide monitors collected data as part of the National Air Pollution Surveillance (NAPS) program in Saskatchewan. A provincial monitor was added to the Lloydminster station early in 1982. Sulphur dioxide levels in the major cities are very low. The provincial one hour standard of 17 parts per hundred million (450 micrograms per cubic metre) was not exceeded at any of the urban monitoring locations.

Table 1 Urban air monitors in Saskatchewan cities

	Present	Proposed
Regina	3 high volume samplers 1 sulphur dioxide monitor 1 haze and smoke monitor 1 carbon monoxide monitor 1 oxides of nitrogen monitor 1 ozone monitor	1 hydrocarbon monitor
Saskatoon	2 high volume samplers 1 sulphur dioxide monitor 1 haze and smoke monitor 1 carbon monoxide monitor	1 oxides of nitrogen monitor 1 ozone monitor
Moose Jaw	1 high volume sampler 1 sulphur dioxide monitor	
Prince Albert	1 high volume sampler 1 sulphur dioxide monitor	
Lloydminster*	1 high volume sampler 1 sulphur dioxide monitor	
Estevan*	1 high volume sampler	1 sulphur dioxide monitor
Swift Current*	1 high volume sampler	
North Battleford*	1 high volume sampler	
Yorkton*	1 high volume sampler	
Weyburn*	1 high volume sampler	
Melville*	1 high volume sampler	
Melfort*	1 high volume sampler	

*Provincial monitor — other monitors supplied by Environment Canada

In Saskatoon during 1981 the provincial one hour standard for carbon monoxide of 13 parts per million (15 milligrams per cubic metre) was not exceeded. The eight hour standard of 5 parts per million (6 milligrams per cubic metre) was exceeded five times. In Regina the one hour standard was exceeded five times and the eight hour standard was exceeded 224 times. The majority of these high readings occurred during a four week monitoring period in November and December. Automobile traffic is thought to be the major contributor to these readings.

An annual air quality index was calculated for Regina based on the available data. Individual indices were determined for ozone, sulphur dioxide, suspended particulates, carbon monoxide and nitrogen dioxide. These were averaged to give an over all annual index of 51 which means that the air quality in downtown Regina during 1981 can be described as poor.

Reports summarizing the provincial air monitoring program are published annually and are available on request from Saskatchewan Environment. Proposed program expansions next year include sulphur dioxide monitoring in Estevan, hydrocarbon monitoring in Regina and ozone monitoring in Saskatoon.

In addition to the NAPS program, the branch operates a mobile air quality station, monitors air quality in the vicinity of various industries and requires licensed industries to carry out air monitoring as an operating permit condition on a number of approvals.

Permit system

The Air Pollution Control Regulations, which became effective in 1975, outline the provincial air quality standards and the requirements for an industrial permit system. New industrial sources of air pollution require permits from the branch. Existing industries do not require permits unless requested by the minister of environment or unless a significant expansion program is undertaken.

During the fiscal year 42 new permits were issued and 163 permits were renewed. (It is anticipated that based on past experience approximately 30 new permits will be issued in the next fiscal year.) Table 2 lists the various types of industry that have been issued permits to operate.

Table 2 — Classification of permits

	New	Renewal	Transfer
Anhydrous ammonia storage facilities	9	50	1
Asphalt plants	1	43	—
Grain elevators	23	30	—
Seed cleaning plant	1	5	—
Incinerators	1	6	—
Concrete batching plants	3	4	—
Pipeline heater	—	2	—
Research nuclear reactor	—	1	—
Sulphuric acid plant	—	1	—
Thermal generating station	—	1	—
Oil dehydration plant	—	2	—
Chloralkali plant	—	1	—
Wallboard plant	—	1	—
Oil gathering and treating facility	—	1	—
Pilot plant	—	2	—
Fibreglass manufacturing plant	—	1	—
Crematorium	1	—	—
Rendering	—	1	—
Charcoal briquetting plant	—	2	—
Miscellaneous industries	3	9	—
Total	42	163	1

Air quality permit system

Permit applications received	206
New permit applications approved	42
Existing permits renewed	163
Permit applications not approved	0
Permits transferred to new owners	1

Industrial monitoring activities

Avonlea Mineral Industries Limited, Wilcox

Complaints concerning dust emitted from the plant were received during the year from residents of Wilcox. The branch established a high volume sampler in the town to measure the concentration of suspended particulate matter in the air. The company has been asked to carry out a cleanup of the plant site in order to minimize fugitive emissions. A report on the cleanup is expected for next year. Increased air quality monitoring will be undertaken by the branch and the company during the next fiscal year.

Federated Co-operatives Limited, Regina

The company is in the midst of an expansion program which will allow high sulphur residual oils to be processed into petroleum coke. In addition, a sulphur recovery plant will be constructed to sweeten refinery gases which are used as fuel in parts of the plant. Both of these measures should reduce ambient sulphur dioxide levels around the refinery. A number of odour complaints were received from nearby residents and increased monitoring in the area will be undertaken by the company and the branch to help determine the odour source.

South Construction Company Limited, Regina

Improvements to the asphalt plant dust control system were incorporated during the latter part of the year and a renewal licence was issued.

Miller Hatcheries Limited, Saskatoon

Additional measures to control odours near the plant were incorporated during 1981. No further complaints have been received.

Pasqua Paving Limited, Regina

The company's asphalt plant operating permit was withdrawn during the fiscal year because of failure to incorporate improvements which were required as conditions of previous approvals.

Interprovincial Steel and Pipe Corporation, Regina

The branch continued to monitor suspended particulate levels around the steel mill as part of its air quality surveillance program. An additional monitor was installed in the Uplands subdivision to determine the impact of plant operation on the nearest residential area. Branch and company monitoring programs will continue next fiscal year.

IPSCO experienced operational difficulties with air pollution control equipment soon after start-up of their newest furnace. The company was given permission to operate the new furnace without controls for approximately six weeks at half the furnace's production rate. Ambient monitoring results showed a deterioration in air quality during this period and a further waiver requested by the company was denied. Operational problems were resolved quickly and air quality in the area showed a corresponding improvement in comparison to the period when the furance was operating without controls.

Poplar River Power Station, Coronach

SPC conducts ambient monitoring for suspended particulates and sulphur dioxide near the plant. The branch also monitors for sulphur dioxide and suspended particulates in the Town of Coronach. Monitoring results obtained during the fiscal year show that the plant has had a small impact on the levels of these pollutants in the area. Air monitoring data is exchanged with U.S. authorities.

Complaint investigation

Forty-six air pollution complaints were received during the fiscal year. In general, the complaints centred on dust and odour from operations such as oil refineries, grain elevators, construction projects and open burning. In a number of cases, small changes to the operation, additional precautions or changes to operating procedures were sufficient to satisfy the complaint. Saskatchewan industries and citizens have been co-operative in eliminating the causes of air pollution complaints. Of the 46 complaints, 16 were resolved in the 1981-82 fiscal year.

Special studies

Regina airborne lead study

This investigation was completed in 1981. Results show lead concentrations typical of many Canadian cities. A report on the study will be released during the next fiscal year.

Regina ozone study

Ambient monitoring of ozone in downtown Regina has shown frequent violations of provincial standards over the past several years. A study to determine naturally occurring background levels of ozone just outside the city was initiated during the fiscal year, and will be completed by the end of 1982.

Ambient monitoring — heavy oil projects

The branch's mobile air quality station was located near a Husky Oil heavy oil project north of Maidstone for most of the year. The station is gathering site-specific ambient air quality data at a number of locations as part of a program which should be completed during 1982-83.

Conservacheck

The branch will be participating in the Conservacheck '82 vehicle safety/emission test lane to be held during August, 1982. Concentrations of carbon monoxide and hydrocarbons in vehicle exhaust are measured to determine engine operating efficiency. Cars requiring tune-ups or major engine maintenance will be identified. Skilled technicians will make minor adjustments to reduce pollution and increase efficiency.

Acid rain

Saskatchewan Environment is a member of a long-range transport of air pollutants technical committee which plans and coordinates acid deposition research and monitoring programs for western Canada. An annual report was released in March, 1982 which outlines the acid rain activities in western Canada during 1981. A snow sampling survey was conducted in January and March, 1982 in northern Saskatchewan. Results of this survey will be released in the next fiscal year.

In the summer of 1980 the department, in cooperation with Alberta Environment and Environment Canada launched a study into the potential for acid rain in northern Saskatchewan and Alberta. The bulk of the work was conducted by the Saskatchewan Research Council. The finalized report will be ready for release early in the next fiscal year.

In March, 1982, the four western provincial environment ministers agreed to work toward a regional approach to controlling acid rain in western Canada.

A task force of senior officials has been established to identify control strategy options to deal with the problems, to assess the technical and administrative feasibility of the options, recommend a preferred option and indicate how it would be implemented to the committee of ministers; this matter will be discussed further at the Canadian Council of Resource and Environment Ministers (CCREM) meeting in Regina in September, 1982.

Regulations

Potash emission regulation

The draft emission regulation has been developed and accepted by the industry and was under review by cabinet at year end. Because of funding restrictions and the impending implementation of the new regulation a decision was made to terminate the potash dustfall program in the upcoming year. The industry, however, through conditions on operating licences, has been asked to continue the dustfall monitoring program around each plant. Reducing emissions to meet the new emission standard will cut down on vegetation and corrosion damage around the refineries.

Air Pollution Control Regulations

A review of the regulations has been undertaken and a number of areas identified which require updating and modification. Additional ambient air quality standards will be proposed and changes to the permit system which would bring major existing industries under the approval process will be made.

Thermal power guidelines

An emission guideline prepared by Environment Canada for coal fired power plants was received during the year and is under review by the department.

Water pollution control branch

- manages water quality and controls pollution through programs of approvals, inspections, and technical assistance for water and sewage works;
- maintains surveillance of provincial waters;
- coordinates collection of samples of surface water, sediments and effluents and interprets data on natural water quality and on raw and treated waters and wastewaters;
- upgrades the skills of operators of municipal water and sewage works and develops and administers a system of voluntary certification;
- establishes quality objectives, sets design and operational guidelines for water and sewage works and recommends conditions for their operation;
- controls pollution through a program of approvals and inspections for industrial wastewater treatment works;
- issues permits and provides advice for aquatic nuisance control;
- investigates complaints about water pollution and recommends improvements;
- assesses water quality components of environmental impact studies and provides water quality advice.

Municipal

Approvals and inspections

During the fiscal year 20 new waterworks and sewage works became operational. New operating approvals were issued by the branch to 8 waterworks and 12 sewage works. At year end, there were 502 waterworks and 476 sewage works in operation. In addition, 477 construction approvals were issued for the construction, alteration or extension of water and sewage facilities, representing a cost of approximately $93,323,000 to the proponents.

A total of 128 visits to 125 municipalities were made by branch staff to inspect water and sewage works or provide technical assistance.

Table 3 indicates major municipal water and sewage projects throughout the province during the fiscal year.

Free analyses program

The branch continued the program of providing two free municipal sewage effluent analyses to

Table 3 — Status of major municipal water and sewage projects as of March 31, 1982

Place	Activity	Description
Fort Qu'Appelle	sewage treatment	nearing completion of physical/chemical sewage plant
Lloydminster	sewage treatment	construction of a new aerated lagoon facility and 30 km treated effluent pipeline to the North Saskatchewan River.
Moose Jaw	effluent irrigation	construction of an effluent irrigation project to handle the city's summer sewage flows
North Battleford	water storage	expansion of the surface water treatment plant capacity by 2.5 times to approximately 760 m^3/
Weyburn	water storage	construction of a new dam to enlarge the Weyburn reservoir, including new intake works, pumphouse and approximately 10 km of new pipeline.

Saskatchewan communities. The analyses are done by the provincial laboratories in Regina.

This program was initiated to help monitor sewage treatment facilities and various effluent qualities. The service was used by 419 communities operating sewage works.

Municipal operator training

The operator training and certification committee, comprised of eight operators from various areas of the province, met two times to discuss training and certification of Saskatchewan operators.

Since its inception in 1977, 241 municipal water and wastewater treatment plant operators have been certified under the voluntary operator certification program. This is about 30 per cent of the total number of operating personnel in Saskatchewan.

Operators are classified at the same level as the facility they operate. All municipal water and wastewater facilities have now been classified according to the accepted formula based on unit process complexity, population served and relative water production or wastewater flow.

During the past year, ten training sessions and regional operator meetings were held throughout the province. Total attendance at these functions was 259. The branch made personal contact with over 32 per cent of the operators in the field.

The branch administers the Western Canada Water and Sewage correspondence course for operators of municipal surface water treatment plants. Seven operators successfully completed the course in the fiscal year.

Industrial

Approvals and inspections

Industrial operations that discharge liquid wastes directly into receiving waters must obtain approvals to construct and operate treatment works under the Water Pollution Control Regulations.

During the report year, five approvals to construct pollution control works were issued to: Interprovincial Steel and Pipe Corporation, Prince Albert Pulp Company, Sask Oil and Gas Corporation Carbon Dioxide Extraction Pilot Plant, Sask Power Corporation Queen Elizabeth Power Station.

Fifteen approvals to operate pollution control works were issued to: ARMAK, Saskatoon Chemicals, Saskatchewan Power Corporation Boundary Dam, Saskatchewan Forest Products Wood Preserving Plant, IPSCO, CSP Foods, PAPCO Pulp Mill, Saskatchewan Power Corporation Poplar River Power Plant, Saskatchewan Minerals, Fresh Water Fish Marketing, CP Rail, CGTX, Sask Oil and Gas Carbon Dioxide Pilot Plant, and Saskatchewan Power Corporation Queen Elizabeth Power Plant.

Eighteen industries continued to operate previously approved pollution control works for industrial discharges, storm water, sanitary sewage and drainage systems during the report year.

Branch staff made 84 visits to the industries to inspect pollution control systems or hold special meetings.

Prince Albert Pulp Company Ltd., Pulp Mill

The quality of wastewater discharged from the pulp mill decreased slightly from the previous report year. The daily average production of pulp at the mill increased slightly as shown in Table 4.

Wastewater quality exceeded the limit 29 times. Seven incidents were due to the new operation of the hot stock washer. Twenty-two excursions were due to a low temperature in the aeration pond (11°C) and problems related to a heat exchanger used in the diffusion washer. Start-ups and shut-downs of this system caused higher loadings to the aeration pond than normal.

Saskatoon Chemicals

Saskatoon Chemicals had 18 excursions of approved discharge limits: five for mercury, 12 for residual chlorine and one for chromium.

In October, 1981 the company installed a new demister to help control the amount of chromium carry-over into effluent via the cooling system.

Armak Chemicals Ltd.

The chemical oxygen demand increased to 295 kg/day, which brings it back up to 1979-80 levels. There were no ammonia nitrogen loading excursions in the 1981-82 fiscal year.

CSP Foods, Nipawin

The oil seed crushing and refining operation near Nipawin continued to produce crude and refined edible oils and a range of oil vegetable products.

A long-term program to upgrade treatment and to make in-plant changes has resulted in a substantial improvement in the plant's effluent quality.

Table 4 — Prince Albert Pulp Co. Ltd. — pulp production data and effluent quality comparisons

	Pulp Production			Effluent Quality	
Year	Yearly Total (ADT)[1]	Days of Production	Daily[2] Average (tonnes/day)	BOD_5[3] Discharged (tonnes/day)	TSS[4] Discharged (tonnes/day)
1978-79	244,992	319	768	5.6	10.1
1979-80	277,299	348	797	5.4	9.4
1980-81	253,110	330	767	6.1	8.2
1981-82	286,000	352	813	5.8	6.5

[1] Air dried metric tonnes

[2] Average daily production while mill was running in air dried metric tonnes per day

[3] BOD_5 — 5-day biochemical oxygen demand

[4] TSS — total suspended solids

Table 5 — Water quality sampling statistics

Type of Sample		Samples	Average number of analyses per sample	Analyses per location for year
Surface Water (basin)	Qu'Appelle	399	27	10,773
	North Saskatchewan	96	30	2,880
	South Saskatchewan	78	28	2,184
	Saskatchewan	56	32	1,792
	Souris	55	36	1,980
	Missouri	44	21	924
	Northern Contract[1]	44	83	3,652
	Other	48	21	1,008
Municipal	Water-Chemical	141	N/A	1,709
	Bacteriological	10,790	1	10,790
	Sewage	130	N/A	2,535
	Free Analysis	212	18	3,816
	Effluent Irrigation	18	31	558
Industrial (company samples)	Papco, Prince	310	14	
	Albert	47	27	5,609
	Saskatoon	359	8	
	Chemicals	191	5	3,827
	Armak, Saskatoon	251	2	
		50	23	1,652
	CSP Foods	201	8	
		52	6	1,920
	Canadian Pacific Rail, Moose Jaw	19	7	133
	SPC — Poplar	136	49	
		867	N/A	9,397
	Other	7	N/A	280
Industrial (department sampling)	Papco, Prince	6	23	
	Albert	20	20	538
	Saskatoon	6	21	
	Chemicals	10	16	286
	Armak	9	21	
		9	16	333
	CSP Foods	10	23	
		9	21	419
	CP Rail	4	20	80
	SPC Poplar	16	N/A	541
	Other	72	N/A	1,604
Special studies	Intensive studies	237	N/A	5,532
	PCB — Regina water	6	1	6
	Halomethanes[2]	41	10	
		82	7	984
	Spring runoff			
	Complaints	85	N/A	1,465
	Sediments	32	17	544
	Plankton	633	1	633
	Quality control	58	18	1,044
	Miscellaneous	128	N/A	1,124

[1] Churchill River and Lake Athabasca basins

[2] Organic compounds produced during the disinfection of water by chlorination.

N/A Not applicable

Surface water

Water quality monitoring

Water quality trends of Saskatchewan surface waters were continuously monitored. During the fiscal year 2,129 water samples were collected and 47,767 analyses performed.

A summary of activities is shown in Table 5.

Data handling

During the report year, work continued on the final stages of a computer based data handling system called Biodat. This system was designed to store and retrieve biological data accumulated by the branch through routine investigations, special projects and information provided by other agencies.

This system is to be intergrated with the chemical water quality data stored on Esquadat, first implemented in 1978.

Sediments

Sampling of sediments from the Fishing Lakes (Pasqua, Echo, Mission and Katepwa) and Buffalo Pound Lake continued for the eighth year.

Qu'Appelle Basin

Buffalo Pound Lake water quality continues to fluctuate from year-to-year as well as seasonally.

Summer water quality has not changed for the Fishing Lakes but some winter values such as dissolved oxygen are better than in 1980-81.

Other major water bodies in the Qu'Appelle basin showed no significant change in water quality. Table 6 indicates comparative water quality for the major water bodies in the Qu'Appelle basin.

Table 6—Waterbodies in the Qu'Appelle basin—range of concentration

	Dissolved Oxygen		5 Day BOD*		Volatile Suspended Solids		Total Phosphorus As P		Total Kjeldahl Nitrogen	
Lake	May-Oct.	Jan.-Mar.	May-Oct.	Jan.-Mar.	May-Oct.	Jan.-Mar.	May-Oct.	Jan.-Mar.	May-Oct.	Jan.-Mar.
Buffalo Pound	2.3-9.9	1.3-11.5	1.4-7.0	0.6-1.4	1-9	1-12	0.05-0.17	0.09-0.16	0.3-1.6	0.7-1.2
Pasqua	0.2-13.2	0.4-11.2	1.8-7.0	0.4-5.0	2-20	7-36	0.33-1.28	0.65-1.23	2.0-7.3	1.8-3.3
Echo	0.1-11.4	2.8-10.8	1.8-6.0	0.6-0.8	4-138	1-7	0.21-1.13	0.55-0.63	1.5-7.5	1.5-2.5
Mission	0.1-10.0	10.6-13.0	1.8-3.0	0.6-2.0	4-7	1	0.2-0.68	0.5-0.55	1.0-1.5	1.5
Katepwa	0.1-5.2	6.2-8.9	1.4-8.0	0.8-1.6	2-10	1	0.25-0.63	0.48-0.5	1.3-2.8	1.5-1.8
Crooked	0.1-7.4	–	2.2-8.0	–	4-7	–	0.3-0.68	–	1.0-1.8	–
Round	1.2-2.0	–	3.8	–	4-7	–	0.45-0.53	–	1.0-1.5	–
Last Mountain	0.3-12.0	6.3-11.8	1.6-7.5	1.0-1.6	5-16	3-8	0.1-0.35	0.8-0.17	1.5-2.3	1.7-2.2
Humboldt	2.0-9.8	–	0.8-1.6	–	1-5	–	0.13-0.15	–	2.8	3.1

Note: Ranges given in milligrams per litre. * Biochemical oxygen/demand (BOD)

Interagency activities

Intensive livestock operations

Under the Pollution (by Livestock) Control Act, intensive livestock operations must receive prior approval for pollution control measures from Saskatchewan Environment before permits can be issued by Saskatchewan Agriculture.

During the report year 98 applications were reviewed and 89 approved.

Solid waste management

Under The Public Health Act municipalities with populations under 5,000 had the option to operate modified landfill systems. The department received 35 applications and approved 23 new sites.

Advice on one new landfill site was forwarded to Saskatchewan Health, the agency responsible for regulation of landfills.

Biocide regulation and research

The branch issued 35 approvals for the application of biocides to public surface water, primarily for control of algae and other plant growth. Thirty-eight approvals were given for use of 15 other chemicals or mixtures for special applications.

The branch was involved in several informal discussions of the relative aspects of biocides and human health. These topics ranged from aerial application of biocides and their effect on populated areas to the general health aspects of registered and non-registered chemicals.

Studies

Spring runoff

Below normal precipitation throughout the 1980-81 winter produced a minimal spring runoff. A reservoir sampling program was started to determine the effects of low runoff on reservoirs in southern Saskatchewan. Forty-seven municipal discharge samples were also collected.

Mercury in fish in Saskatchewan waters

The branch continued to participate in an interdepartmental committee to review mercury concentrations in Saskatchewan fish. The main purposes of the committee are to advise Saskatchewan Health of hazardous mercury concentrations, to advise Saskatchewan Tourism and Renewable Resources about licensing restrictions and to develop schedules for monitoring the mercury concentrations in provincial fish. In the last function the branch assisted in developing statistical guidelines for the sampling and evaluation program.

Mercury in fish in Cookson Reservoir

In December, 1979, high mercury concentrations were found in the walleye in Cookson Reservoir, a new impoundment on the East Poplar River. It has recently been suggested that high mercury concentrations may be a common phenomenon in new reservoirs and, for this reason, these studies have attracted considerable attention. Continued monitoring of mercury levels is being carried out and a final report has been prepared.

Mercury in new reservoirs

Because recent literature suggests that high mercury concentrations may be a common phenomenon in new reservoirs, the branch has initiated studies on new reservoirs in Saskatchewan. Analyses from core samples taken last year at the new Kipling reservoir indicated low levels of mercury and selenium. Monitoring will be continued next year.

Municipal drinking water quality surveys

Arsenic survey

In the summer of 1981 arsenic measurements were completed on the water from a city of Regina well. Although the level reported was below the maximum acceptable concentration for drinking water, repeat monitoring of the Regina wells was initiated to determine if levels were changing over time. Testing indicated that most wells had detectable levels of arsenic but all concentrations were well below the maximum acceptable concentration of 50 parts per billion or 0.05 mg/l for drinking water. The level of arsenic in tap water in Regina which was tested on several occasions from different areas of the distribution system was found to be very low.

The detection of arsenic in Regina wells stimulated testing of representative municipal supplies throughout the province. To date approximately 125 community water supplies have been tested. All are well within the 50 ppb limit for drinking water.

Biocide survey

A special water quality survey was initiated during the 1980-81 fiscal year to determine the levels of biocides in representative water supplies throughout the province. Twenty-five communities which use surface water were selected on the basis of location, size and type of water treatment.

During the 1981-82 fiscal year a total of 34 supplies were monitored. The communities selected included 18 centres where levels of biocides were detected during the previous year. Of the 39 communities monitored to date 30 water supplies had detectable levels of α -BHC, a degradation product of lindane. Traces of one or more of the compounds 2,4-D; 2, 4, 5-T and Silvex were detected in five water supplies. α -BHC has been found to be common in surface waters in the

prairies. A 1977 report by Environment Canada states that atmospheric transport is a possible source. Further monitoring for biocides is recommended to confirm that municipal supplies remain within established limits.

Trihalomethane survey

Thirty-three community water supplies were monitored for trihalomethanes during the 1981-82 fiscal year. This completed a survey of all municipal waterworks using surface water supplies for part or all of their supply. Although most of the communities surveyed are well within maximum acceptable limits, a few communities have had periodic levels of trihalomethanes which approach the maximum acceptable concentrations.

Recreational lakes

An intensive water quality study was initiated at Emma and Christopher Lakes in August 1981. The study was designed to identify water quality concerns and to gather data for assessing the long term influences of recreational usage and development on lake water quality. Three seasonal surveys were carried out in 1981-82 with samples being collected for analyses of heavy metals, routine chemical variables and bacteria. Fish, benthos, macrophyte and bacteriological samples were also obtained. A report is to be completed during the following year.

Land protection branch

- administers the Environmental Spill Control Regulations;
- develops and administers hazardous waste management programs;
- develops and administers management programs for urban areas subject to severe flooding;
- develops and administers, in co-operation with other departments, shoreland management policies and programs;
- administers the Reservoir Development Area Regulations for designated areas;
- administers the Litter Control Act and Regulations pertaining to beverage containers;
- co-operates with other departments in investigating and promoting opportunities for recycling waste materials.

Waste management division

Hazardous wastes

The problem of hazardous waste management is of concern to industry, all levels of government, and the public. During the fiscal year, amendments to The Department of the Environment Act were initiated to provide the authority to regulate hazardous waste management including recycling, transport collection and storage, landfills and special treatment facilities.

In order to gain information on methods of tracking the movement of toxic wastes from the generator through to the treatment or disposal of the material a contract was awarded to M M Dillion Ltd. to review manifest systems that are currently in use and to recommend a system for Saskatchewan. An inventory of hazardous waste materials that are being generated in the province is also being prepared.

The department, in co-operation with the Saskatchewan Association of Rural Municipalities and the Saskatchewan Urban Municipalities Association organized a symposium on hazardous waste management which was held in Saskatoon in April, 1982. This symposium explored options for the management of today's hazardous wastes and investigated the development and implementation of hazardous waste management strategies.

Biocide containers

Over this past year concern of farmers, farm organizations and local government about the disposal of agricultural biocide containers continued to grow. In an attempt to address this problem steps were taken to form an industry-farmer-government task force to investigate and report to the Saskatchewan minister of the environment on options for agricultural chemical container disposal.

Beverage containers

The soft drink and beer bottle return rates rose to 83 and 88 per cent respectively. The number of complaints handled about the failure by vendors to comply with bottle refund regulations fell for the second year in a row, from 27 to 22.

Northern forest clean-up

For the second year in a row the department contracted a litter cleanup team in northern Saskatchewan which inspected and cleaned up a number of sites along 2,400 kilometres of roadways and 570 kilometres of canoe routes. Some litter was buried on-site, however, most was transported to community waste disposal sites for disposal. The quantity of litter found this year was less than last year.

Land management division

Floodplain management program

General investigations and policy development

The division provides information on flood hazard potential affecting development proposals to other provincial departments, municipalities and private interests.

During the year, the division reviewed 63 subdivision proposals in urban centres in the province to assess the degree of flood risk, the impacts of the land uses and the feasibility of using floodproofing techniques.

Four zoning bylaws were reviewed and comments related to floodplain management techniques provided. During the year work related to flood hazard area delineation, dyking, flood insurance, and the design flood frequency was initiated by the division.

Canada-Saskatchewan Flood Damage Reduction Program (FDRP)

In April, 1977, two flood damage reduction agreements were signed between Saskatchewan

Environment and Environment Canada. A general agreement outlines the broad goal of the two governments, which is to reduce damage in flood hazard areas through better floodplain management. The second, a five year $1.7 million cost-sharing mapping and studies agreement is more specific and provides for the completion of studies, maps and the designation of flood hazard areas. Similar agreements are in effect in most other provinces.

Committees were established under each agreement. The division is represented on the steering and technical committees and acts as program co-ordinator of the mapping and studies subagreement. The division finances and administers mapping and studies, largely by contract to the public and private sectors, then cost-shares the expenses with Environment Canada. Inspection of the floodplain management studies is conducted within the division.

The FDRP is into the fifth year of the current five-year subagreement. It is proposed that the program be extended to accommodate detailed technical studies not yet completed. Additional flood prone communities are also being added. As shown in Table 7, various stages of work were completed or under way in 29 Saskatchewan communities during the report year.

Public information continued to be an important part of the program. A full time position was established under contract to co-ordinate an information program and visits were undertaken to 16 communities.

On August 1, 1980 flood hazard areas in the communities of Estevan, Roche Percee and Oxbow were designated on an interim basis. A final

Table 7 — Mapping and studies program status

Community	Air Photos and Ground Survey	Base Mapping	Hydrology Study	Hydraulic Study	Planning Study	Information Map
Battlefords	Complete	Complete	Complete			
xBeauval						
xBig River						
Buffalo Narrows	Complete	Complete				
Carrot River	Complete	Complete	Under Way			
Craven	Complete	Complete	Under Way	Under Way	N/A	
Eastend	Complete	Complete	Complete	Complete	Complete	
Estevan	Complete	Complete	Complete			
Ft. Qu'Appelle	Complete	Complete	Under Way			
Gravelbourg	Complete		Complete			
Green Lake	Complete	Complete				
Hodgeville	Complete	Complete	Complete		N/A	
Ile-a-la-Crosse	Complete	Complete				
Kamsack	Complete	Complete	Under Way			
La Ronge	Complete	Complete	Complete	Under Way		
Lebret	Complete	Complete	Complete	Under Way		
Lumsden	Complete	Complete	Under Way	Under Way		
Melfort	Complete	Complete	Complete	Complete	N/A	Under Way
Moose Jaw	Complete	Complete	Complete	Complete	Under Way	Complete
Oxbow	Complete	Complete	Complete			
Prince Albert	Complete	Complete	Complete	Under Way		
Radville	Complete	Complete	Complete			
Regina	Complete	Complete	Complete	Under Way		
Roche Percee	Complete	Complete	Complete			
Saskatoon	Complete	Complete	Complete	Under Way		
Swift Current	Complete	Complete	Complete	Complete	Complete	Under Way
Tantallon	Complete	Complete	Under Way	Under Way		
Tisdale	Complete	Complete	Under Way			
Val Marie	Complete	Complete	Complete		N/A	
Weyburn	Complete	Complete	Complete	Complete	Under Way	Under Way
*Yorkton	Complete	Under Way				

N/A — No Planning study anticipated for this community

* — Is being added to the program. x — to be deleted from program.

designation of the floodplain in Moose Jaw occurred on October 15, 1981.

As the year ended the minister directed the deferral of further designations pending the development of post-designation policies and programs and a review of the program's management structure. The deferral was in response to valid public concern raised about the impact of the FDRP in designated areas, and is to remain in effect until substantial progress has been made on the development of appropriate post-designation policies and programs regarding matters such as property acquisition/relocation, floodproofing assistance, and the construction of flood control works.

Shoreland management program

Reservoir development areas

Under The Water Resources Management Act, revisions were initiated to consolidate the Reservoir Development Area Regulations, 1976, and the Recreation (Residential) District Building Regulations, 1969.

There are presently seven designated provincial reservoir development areas containing 5,700 square kilometres established pursuant to the provisions of The Water Resources Management Act: Lake Diefenbaker, Blackstrap, Brightwater, Bradwell, Zelma, Dellwood and Avonlea.

Under the Reservoir Development Area Regulations, development permits must be obtained from the department before construction or land use changes can proceed. Development plans were prepared for the reservoirs at an early date with a view to achieving compatibility between the land and water uses of the reservoir areas; the result is essentially one of environmental quality control.

During the year, the branch issued 29 development permits at Lake Diefenbaker and one each at Blackstrap, Brightwater and Bradwell Reservoirs. Out of the 32 permits issued, 29 were for agricultural purposes and three for residences and residential sites.

Technical and professional advice is always available to any person, group, local government body or other government agency considering development around water bodies, whether or not it is within a reservoir development area.

All municipal offices within the reservoir development areas were visited during the year to make sure that local officials were familiar with the reservoir development area concept and its objectives. These visits also allowed for informal discussion of the regulations, the identification of problems in the development area and discussion of local concerns.

Several other items within reservoir development areas were also completed during the year including:

(a) contacts with cottageowners' associations and municipalities to implement updated building standards and zoning bylaws for cottage areas.
(b) contact with municipalities, other government agencies and the public on proposals to amend the Reservoir Development Area Regulations allowing country residences on small non-farm parcels. This led to an amendment of the regulations in July.

The Reservoir Development Areas, since their beginning, have been sign posted along the roads leading into the areas. Signs were redesigned in 1981-82 to conform to the provincial visual identity program. Technical staff will be using these new signs as needed to replace existing signs as they become unservicable due to weathering or other reasons.

Subdivision proposals

Subdivision proposals are examined throughout the province by the division to ensure, among other things, that development proposals are not subject to soil instability, flooding, or other hazards. These problems are of particular concern to large developments located on hillsides close to water bodies.

The division reviewed 61 shoreland subdivision proposals, 34 country residential subdivision proposals, 34 commercial/industrial proposals and three subdivisions for municipal services. These proposals were referred to the branch by Saskatchewan Urban Affairs, Saskatchewan Rural Affairs and the Department of Northern Saskatchewan. After reviewing their environmental suitability and possible impact on other nearby uses, the branch provided comments and recommendations to the referring department.

Studies

Work was completed in 1980-81 on a study to develop criteria for assessing the environmental carrying capacity of shoreland areas. In 1981-82, the report was printed and distributed to interested municipalities, cottageowners', associations, public and university libraries, other government agencies and the public.

During the year a study was undertaken to establish development criteria intended to safeguard environmental quality, particularly within reservoir development areas. This study was

nearing completion at the end of the year and is expected to be printed and distributed to interested parties during 1982-83.

Investigations

Investigations were carried out on reported shoreland problems. Most involved the dumping of debris into lake beds and rivers.

Boating conflicts

The branch contributed to an interdepartmental committee established in 1979-80, to minimize boating conflict on provincial water bodies by enforcing the boating restriction regulations under The Canada Shipping Act. This committee is working towards implementing the regulations in Saskatchewan.

Project reviews

During 1981-82, the section reviewed the following project proposals or reports from a land use and land protection perspective:

(i) 32 project proposals or impact assessments referred by the environmental assessment secretariat (25 were drainage projects);

(ii) 5 reports referred by the environmental assessment secretariat and the policy, planning and research branch. These reports concerned reclamation of land subject to surface disturbance as a result of the extraction of coal, sand, gravel and clay.

(iii) 3 other studies referred by other agencies. These studies included:
   (a) a background paper regarding planning in Saskatchewan;
   (b) a social and community impact assessment; and
   (c) a municipal development plan.

Spill response and control section

This is the first full report period since the enactment of the Environmental Spill Control Regulations and the establishment of the spill response and control centre in March, 1981.

The intent and wording of Environmental Spill Control Regulations, 1981, under The Department of the Environment Act were clarified. During this first year the spill response and control centre handled 241 spills of various hazardous materials and acted on numerous complaints and requests for information concerning waste handling and disposal. This figure does not include 23 incidents which were reported but fall into the following circumstances:

(a) volume of spilled material(s) below reportable limits;
(b) incidents reported to the centre involving hazardous material but involving no actual spill; and
(c) spill incidents involving no discharge into the environment.

The above figure also excludes spills of oil, gas or salt water associated with the production or distribution of oil or gas. These spills are regulated under The Oil and Gas Conservation Act administered by Saskatchewan Mineral Resources.

Table 8 summarizes the number of spills reported, the product, the total volume spilled, and the quantity recovered, where applicable. Petroleum products account for 62 per cent of the total spills. A further breakdown of this category is

Table 8 — Spill statistics by product, number of incidents and quantity

Product Spilled	Number of Incidents	Volume Spilled (m^3)	Volume Recovered (m^3)
1. **Petroleum Products**			
(a) Gasoline	54	217	16
(b) Diesel and Heating Fuel	65	170	24
(c) Asphalt/crude	9	250	185
(d) Others	22	45	5
Subtotal	150	682	230
2. **Non-Petroleum Products**			
(a) Agricultural Chemicals	21	3	
(b) Acid/Bases	11	63	
(c) Uranium Mine Tailing Water	6	749	
(d) Waste Products	10	3,366	
(e) Transformer oil/PCBs	11	4	
(f) Miscellaneous	32	3,543	
Subtotal	91	7,728	
Total	241	8,410	

Table 9 — Petroleum product spill statistics by source, number of incidents and quantity

Cause of Spill	Number	Volume Spilled (m^3)
Truck transport	46	248
Above ground tank leak	6	22
Underground tank leak	16	91
Tank overflow	37	226
Equipment failure	12	54
Line leak	11	27
Others/unknown	22	14
Total	150	682

shown in Table 9. Transportation and bulk station storage were the major sources of spills.

Other spilled products are categorized as non-petroleum products which include agricultural chemicals, acids/bases, PCBs, and other chemicals.

A radiation safety seminar was held in October, 1981 as a training program for spill team members and other department personnel.

A series of spill control workshops were successfully presented at eleven major locations in the province, by the spill section staff, to local government agencies, emergency response personnel and industries. The general response to the workshops was very positive. Additional requests to present similar workshops in different communities have been received.

Work has started on the preparation of a field manual to assist spill team members in handling spill reports. The manual will include expert and emergency contacts, response guidelines, and other related information.

Poplar River Power Station

Saskatchewan Power's Poplar River power station reported 14 spill incidents to the department this fiscal year. Ten of these spills involved accidental discharges of ash slurry water from the plant due to ash line leakage or ash water tank overflow. The total volume of ash water spilled is approximately 4000 metres^3; however, only a small amount actually entered Cookson Reservoir. Department staff reviewed spill response procedures and the need for spill prevention and contingency planning with SPC officials. The remaining spill incidents involved petroleum products and other industrial chemicals used on-site.

Federated Co-operatives Keylock Installation, Saskatoon

A discharge of petroleum products from a city storm sewer prompted a department investigation to identify the source of pollutants. A commercial keylock installation operated by Federated Co-operatives Ltd. was found to be the source. Recovery sumps were installed by the company at the site to remove the petroleum products from the contaminated soil. Over 1,800 litres of petroleum products have been recovered to date. The company is continuing the recovery process and has retained a consultant to prepare a proposal for further remedial work.

Estevan Co-op Service Station

Strong gasoline odours in a building adjacent to the Estevan Co-op service station this past winter prompted test hole drillings on the Co-op property. Following the department's request that the company clean up the site, the contaminated area was excavated and backfilled with clean soil.

Trucking incidents, north of La Ronge

Over the last winter a number of tanker truck incidents occurred along the highways north of La Ronge. Approximately 8,000 litres of heating fuel were spilled. Due to severe weather conditions, final clean up operations were delayed until early this spring. In additional to the fuel recovered, a total of about 100 cubic metres of contaminated soils were removed and disposed of.

Pesticide spills

The spill response and control centre received several reports of pesticide spills during the year including incidents at the Saskatchewan Transportation Company Regina Bus Depot, Canada Messenger's warehouse in Regina and Saskatoon's Agro Supply warehouse. Cleanup materials from the spills were disposed by an out-of-province chemical waste company.

Mines pollution control branch

- administers a program to control the environmental effects of all mining development through licensing, monitoring, and inspections;
- inspects operations and conducts monitoring of effluents and receiving waters at mine sites;
- evaluates the technical aspects of the design and construction of solid and liquid waste management systems and air pollution control facilities;
- administers a program for protecting the public from naturally occurring radiation;
- administers a program of abandoned mine reclamation.

Administration

Branch development

Saskatchewan Environment is directly responsible for setting and enforcing environmental protection standards for all mining and milling operations in the province.

In January, 1980, responsibility for preventing environmental damage caused by the uranium mining industry was transferred from Saskatchewan Mineral Resources to Saskatchewan Environment. Until that time, the environment department acted as a consultant to Saskatchewan Mineral Resources, recommending controls for mine development and operation.

During this fiscal year, the branch's mandate was expanded to including all mining operations in the province.

Legislation

During the fiscal year a final draft of the new uranium mining pollution control regulations was prepared.

A new set of regulations were also written under The Department of the Environment Act entitled "The Mineral Industry Pollution Prevention Regulations." They provide a basis for the branch's licensing program in its expanded area of responsibility.

Mines division

Uranium mine operation

The division is responsible for licensing, monitoring and inspecting all uranium mining operations in the province. Staff visit sites to make inspections and take samples. In addition, companies are required to monitor on a regular basis and submit all data to the division. The public has access to all licences issued and monitoring data.

During the report period one of the three operating uranium mines in the province, Eldorado Nuclear, announced that their operation was to be permanently shut down. The company had previously provided the branch with a conceptual abandonment plan, but with the announced closure, the company was required to begin work on a detailed decommissioning and reclamation program. Several meetings were held between the company and the various regulatory agencies and general agreement was reached on the approach the company was to take in the development of their decommissioning and reclamation program.

Branch staff conducted 36 on-site inspections of the operating facilities and 16 on-site inspections of the proposed or developing mines. Over 95 samples were taken during the inspections which resulted in more than 2,500 analyses being conducted. In additon, operating mines were required to conduct more than 10,000 separate analyses to monitor the environmental impact of mine production.

Potash mine operations

Due to problems in recruiting qualified staff for the expanded program, Saskatchewan Mineral Resources continued to issue licences to potash mines until March, 1982. The new legislation developed by the mines pollution control branch became effective in March, 1982, and will form the basis for the branch's licensing program during the next fiscal year.

Mine abandonment

The division is involved in a program to eliminate environmental and safety hazards at abandoned mining operations in the north. More than 130 sites in the north have been identified, many of which will need to be cleaned up. To date, approximately 20 sites have had reclamation work completed.

During the reporting period, the branch commissioned additional studies into the Newcor mine site at Creighton to develop the information base needed to develop a cleanup plan.

Radiation division

Uranium City cleanup

The division manages the provincial involvement in the Uranium City radiation cleanup program. During the report period the cleanup program was completed. The division is now involved in the ongoing maintenance of the equipment installed during the program.

Due to the closure of the Eldorado Nuclear mine it is anticipated that the ongoing maintenance program will be reduced significantly during the fiscal year.

Natural radiation

Uranium is present in most Saskatchewan soils. To prevent a situation similar to that of Uranium City, the division is undertaking a province-wide study to identify other areas where the possibility of natural background levels of radiation in the soil are high. The study is expected to take several years to complete, at which time a report will be made available to the public.

The first phase of the study was conducted in 16 non-mining northern Saskatchewan communities during the summer and fall. A summary report for public information has been released.

The second phase of the study involved a survey of communities in the southeast portion of the province. A report on this work is presently being prepared.

Interagency activities

All aspects of uranium exploration and development which involve over 10 kilograms of uranium require licensing by the Atomic Energy Control Board (AECB). The AECB is concerned primarily with control of uranium from the ore body through its intended use and also with any radioactive waste disposal. The branch works closely with the board to ensure there is no conflict of objectives and to minimize overlap in the control.

The Department of Northern Saskatchewan is responsible for negotiating and issuing surface lease agreements to companies developing uranium resources. Conditions of agreements include occupational health, manpower, environment and mine and mill abandonment procedures. The branch works closely with the department in developing and implementing sections dealing with environmental and abandonment concerns.

Three agencies, the Atomic Energy Control Board, the federal Ministry of Transport, and Saskatchewan Environment are involved with the transportation of hazardous substances. The mines pollution control branch assists with inspections and remedial actions for spills of materials to and from mining operations.

Water Management Service

S. R. Blackwell, Executive Director

D. L. MacLeod, Director
Hydrology Branch

A. L. Jones, Director
Water Rights Branch

A. C. Schuster, Director
Qu'Appelle Implementation Branch

Water management service

General

The water management service has responsibility for over all management and control of the province's water resources. Through two of its major branches, the service provides basin studies, streamflow monitoring and forecasting, project operation, central hydrologic and geohydrologic services and licensing of water use and drainage. The service also administers water use, drainage, and water use charges, participates in interjurisdictional water matters and maintains water resource inventories.

The water management service is responsible for implementing three federal-provincial agreements. The Canada-Saskatchewan Qu'Appelle Agreement is administered through the Qu'Appelle implementation branch while the Interim Subsidiary Agreement on Water Development and the Canada-Saskatchewan Hydrometric Surveys Agreement are managed through the executive director and the hydrology branch.

Qu'Appelle Valley Management Board

This board was created to oversee the implementation of the $34 million Canada-Saskatchewan Subsidiary Agreement on the Qu'Appelle Valley. The executive director of water management service serves as the alternate to the deputy minister on this board. One of the main responsibilities of the board is to ensure that the work done in the Qu'Appelle Valley adheres to the following objectives of the agreement;

- ensure the long-term productivity of the recreation and tourism resource base in the Qu'Appelle Valley;
- improve incomes and the diversity of employment opportunities for residents of the Qu'Appelle Valley;
- increase recreational opportunities for residents of nearby urban centres; and
- improve the management of land and water resources of the Qu'Appelle Valley.

Details of this year's activities under this agreement appear under the Qu'Appelle implementation branch section of this report.

Water development

The three-year Interim Subsidiary Agreement on Water Development for Regional Economic Expansion and Drought Proofing (SAW) was signed by Canada and Saskatchewan on May 17, 1979. The general intent of the agreement is to improve the potential for economic and socio-economic development by lessening the effects of recurrent water shortages, droughts and flooding.

With plans for a two-year extension, this agreement provides for work in three sectors, namely:

Sector A — Water management activities
Sector B — Water supply
Sector C — Flood damage reduction

Sector A includes drought proofing studies to evaluate the impacts of droughts on the Saskatchewan economy and to develop long-term strategies to alleviate the impacts. Phase I, consisting of some 14 tasks, was initiated in the summer of 1981 and should be completed as scheduled by the fiscal year-end, 1982-83.

Sector A also provides for the investigation and analysis of ground and surface water systems. Three ground water systems are being explored:

- Estevan Valley aquifer near Macoun where field investigations are being scheduled for the summer, 1982;
- a portion of the Hatfield Valley aquifer. The Saskatchewan Research Council completed field work in the fall of 1981 and is scheduling three reports to be completed by June 15, July 1 and July 15, 1982;
- a portion of the Judith River formation in southwestern Saskatchewan. Silverspoon Research and Consulting Ltd., Saskatoon, completed the field work at the end of March, 1982 and is documenting the results for presentation by June 1, 1982.

Sector B provides for the investigation and development of water supply projects. Communities for which works have been built or are under construction include Birch Hills, Humboldt, Kipling, Melfort and Weyburn. Centres for which investigations have been completed or are well underway include Canora, Ceylon, Grenfell, Kerrobert and Radville. Investigations are current at Maidstone, Manor and Melville. Other centres approved for investigations are Redvers and Watrous.

Sector C, which provides for the implementation of certain flood damage reduction measures as recommended in the Souris River Basin Report, has seen limited progress. The development of a complement of works for Weyburn which had been given major impetus is held up because of the lack of prerequisites — designation of the flood hazard area and local government zoning and land use regulations.

Canada-Saskatchewan Hydrometric Surveys Agreement

The executive director of the water management service represents Saskatchewan in the joint administration with Environment Canada of the hydrometric surveys agreement. The administrators of this agreement have responsibility for establishing the budget for this monitoring program and for directing the technical committee that coordinates activities under the agreement.

Canada-Saskatchewan consultative committee

The six-member Canada-Saskatchewan consultative committee was set up under The Canada Water Act to discuss joint federal-provincial water supply and quality programs and to provide a senior review committee for federal-provincial joint study and implementation proposals. The department's deputy minister and executive director of the water management service are members of this committee.

At the March 10, 1982 meeting, this committee dealt with a wide range of topics including the Lower Saskatchewan River Basin, Qu'Appelle Implementation, the Regina-Moose Jaw area studies, future basin studies, weather office activities, the Subsidiary Agreement on Water (SAW), the Flood Damage Reduction Program, numerous international basin activities, water monitoring programs and the National Hydrology Research Institute.

Prairie Provinces Water Board

The executive director of the water management service represents Saskatchewan on the Prairie Provinces Water Board (PPWB). This board is responsible for administering the 1969 Master Agreement on Apportionment which applies to eastward flowing watercourses, and for co-operation and consultation among the three prairie provinces and Canada on interprovincial water matters.

The PPWB met twice during the report year. Matters dealt with included the administration of the apportionment agreement, projects with interprovincial implications such as the Cold Lake Oil Sands Project, the proposed Slave River Hydro Development, the Bredenbury Potash Mine, the Nipawin Dam, Qu'Appelle River conveyance, the Cumberland Marsh Ducks Unlimited Project, as well as ground water development, water quality, Battle and Lodge Creeks apportionment and water use inventory.

The committee on water demand, established by the PPWB in 1978, has advanced with the inventory of historical and current use of water in the prairies portion of the Saskatchewan-Nelson basin. Work on all six sectors - agriculture, municipal-industrial, power, recreation, environmental considerations, and the regional and economic base, progressed favorably to the stage where documentation of work on all sectors is essentially complete. The sector reports and the main report will be available in the fall of 1982.

The hydrology branch represents the province on the PPWB committee on hydrology. This committee is responsible for hydrologic studies required by the Board. The branch is currently involved with an investigation into the effects of agricultural drainage in an eastern Saskatchewan area on farms and municipal roads in Manitoba.

The water rights branch represents the water management service on the PPWB committee on interjurisdictional agreements administration. During the year, this committee finalized its report to PPWB on administration problems in the Battle and Lodge Creek basins. As well, the branch's ground water division represents the department on the recently established committee on ground water.

Representation on the PPWB committee on water quality is provided by the water pollution control branch.

South Saskatchewan reservoir board

The South Saskatchewan reservoir board was formed in 1968 following construction of the South Saskatchewan River project. It consists of two representatives of the federal government and two representatives of the province, one of whom is the executive director, water management service.

The board meets periodically to review project administration and to make decisions on operation planning for Lake Diefenbaker.

South Saskatchewan River project

All control works and land associated with the South Saskatchewan River project were transferred from Canada to Saskatchewan, April 1, 1969. Canada retained responsibility for maintenance of the project until April 1, 1981, under terms of the 1958 agreement for project construction. A commitment from the federal government to continue maintaining this major project has been arranged with the Prairie Farm Rehabilitation Administration (PFRA) until 1986.

This year, negotiations continued on an amendment to the 1958 agreement which would commit Canada to further responsibilities on the project until March 31, 1994.

Mackenzie River basin committee

The deputy ministers of Saskatchewan Environment and Northern Saskatchewan represent the province on the Mackenzie River basin committee. The executive director of the water management service is an alternate member and served as chairman throughout the year. Two meetings of the committee were held during the fiscal year.

A task force, established by the committee in 1976 to implement a $1.6 million study of basin water resources completed its work early in the year and, on February 26, 1982, made the study reports available for release at a meeting of federal and provincial ministers in Edmonton. By March 31, 1982, the study report and nine supplements were widely distributed.

Early in the new year, the committee will be meeting to arrange for ways and means to implement a broad range of water resource activities encompassed in a series of nine recommendations contained in the study report.

Cumberland Lake control structure proposal

This proposal has resulted because water resource developments in the Saskatchewan River Basin upstream of the Cumberland Lake area have altered the amount and pattern of flow to produce lower than normal water levels on Cumberland Lake.

A steering committee, with representation from Saskatchewan Environment, Northern Saskatchewan and the Saskatchewan Power Corporation, is responsible for determining the feasibility of the control structure. This year, Northern Saskatchewan sponsored preliminary feasibility studies of a proposal to construct a concrete weir across the Bigstone Cutoff of the Saskatchewan River at Cumberland House. Several alternative weir elevations are being investigated which would have the effect of raising the average water level of Cumberland Lake by amounts ranging from 0.3 to 1.2 m. By year-end, the engineering design of a complement of works, the costs and a statement of the environmental impacts, were nearing completion.

Committee on recreation and wildlife projects

This interdepartmental committee is chaired by the executive director of the water management service and includes participation from the water rights branch, the hydrology branch, Saskatchewan Agriculture and Saskatchewan Tourism and Renewable Resources.

The purpose of the committee is to resolve conflicts of interest associated with recreation and wildlife water projects. The division provides input on the hydrologic aspects of projects being considered by the committee, such as the Emma-Christopher Lake complex, and the Candle Lake, Cumberland Marsh and Makwa Lakes projects.

Hydrology branch

- conducts hydrologic investigations associated with basin planning studies and watershed development proposals;
- provides hydrologic services for provincial agencies;
- carries out reservoir and river system operation planning;
- provides provincial streamflow forecasting service;
- collects basic hydrometric, meteorologic, snow survey, sedimentation and related data;
- participates on provincial and intergovernmental boards and committees;
- maintains liaison with other departments and agencies to ensure cooperation in operation and development planning;
- represents Saskatchewan and provides support in administering jurisdictional water resources.

Special activities

Committee on hydrology

The director of the branch represented the province on the Prairie Provinces Water Board (PPWB) committee on hydrology, which provides advice and assistance to the board on all matters relating to surface water hydrology. During the year, the committee met three times on a very broad range of matters that included interprovincial apportionment on westward flowing tributaries of eastward flowing streams. A draft report on this subject was prepared for the PPWB during 1981/82.

Steering committee for the Regina-Moose Jaw area long-term water supply study

This committee is co-chaired by the director of the hydrology branch and the director of public works and engineering for the City of Regina. It was established in January, 1981 to administer a two-phase study for determining the most feasible plan to meet long-term water supply needs of Regina and Moose Jaw and the surrounding area.

There were fourteen steering committee meetings held during the 1981-82 fiscal year. A broad range of water supply alternatives was evaluated this year and the results of that evaluation were documented in the Phase I report; released on February 26, 1982. The committee recommended in the Phase I report that four of the water supply alternatives should be carried over for a detailed evaluation in Phase II studies during the 1982-1984 period.

Flood damage reduction program (FDRP)

During the report year, there was an integrated effort within the hydrology branch that resulted in a number of significant contributions to the FDR Program. The director, hydrology branch, continued to serve on the FDR steering committee. Also, representation on the technical advisory committee contributed to day-to-day direction and co-ordination of the technical work in co-operation with the land protection branch. In addition, hydrology studies were completed and final reports submitted for Gravelbourg, Hodgeville, Regina and Saskatoon. Final draft reports were produced for the four urban communities in the Qu'Appelle Valley and for Kamsack. Flood hazard mapping (hydraulic studies) was nearly completed for Craven and a draft report with preliminary mapping was produced for Regina by year-end. A more detailed progress report on the FDR mapping program is provided in the land protection branch section of this report.

Joint Canada/U.S.A. research project

In 1979, the U.S.A. and Canadian national hydrological committees agreed that efforts and results of hydrological research activities, common to both countries, should be shared where possible. One such activity is the areal measurement of the snow water equivalent of the snowpack.

In February, 1982, the hydrology branch participated in the joint Canada/U.S.A. research project conducted in south-eastern Saskatchewan. The purpose of the project was to test various remote sensing techniques for measuring the snowpack water equivalent.

Intergovernmental studies division

This division is responsible for field and office investigations associated with intergovernmental studies.

During the report year, day-to-day input to the Canada-Saskatchewan Flood Damage Reduction Program (FDRP) continued. Work on the FDRP is coordinated in the department by this division and by the land protection branch. A progress report on the mapping and studies program is provided in the land protection branch section of this report.

This division provided provincial management service during 1981/82 for the Canada-Saskatchewan Interim Subsidiary Agreement on Water Development for Regional Economic Expansion and Drought Proofing. Work under the Canada-Saskatchewan Hydrometric Network Agreement was also coordinated for Saskatchewan by this division during 1981/82.

Investigations division

The investigations division is responsible for carrying out hydrologic investigations related to the various aspects of water resource development and management in Saskatchewan.

General hydrologic investigations

The division conducts investigations to provide other branches, departments and agencies with hydrologic information for project design, construction, operation and water use regulation.

About 50 per cent of the staff time was devoted to this activity, which included major studies of the Assiniboine-Whitesand Rivers, Upper Notukeu Creek, Wood River, Wiwa Creek and the Frenchman River Basin.

Water supply investigations

Water supply studies for Avonlea Creek Reservoir, Aberdeen North Flood Control, Eva Lake, and Chapleau Lakes were among the 36 projects that the division completed for the water rights branch during 1981-82.

Flood peak potential studies

The division carried out 32 flood peak potential studies during the fiscal year. These reports provide government agencies such as Saskatchewan Rural Affairs, Saskatchewan Highways and Transportation and Northern Saskatchewan with hydrologic information for use in the design of safe and efficient bridges, culverts and other such structures.

Safe building elevation studies

The division reviewed 39 lakeshore subdivision proposals for the land protection branch. Proposed waterfront subdivisions are analyzed to determine their susceptibility to high water levels and the department, through the land protection branch, recommends to Saskatchewan Urban Affairs on their suitability for recreational or permanent residential development.

Drainage impact studies

The division provides a service of conducting drainage impact studies to evaluate the effect of drainage projects on downstream river flows and lake levels. These studies provide the necessary information needed for issuing permits and evaluating complaints under The Drainage Control Act. A total of 22 impact assessments were made during the year.

Hydrometric network

Water level and streamflow data were collected and published to provide a basis for the management and allocation of water resources in Saskatchewan and with neighbouring provinces and states.

During the fiscal year, 368 hydrometric stations were operated under the federal-provincial cost-sharing agreement as shown in Table 10. Environment Canada published the majority of data for the hydrometric network. However, the investigations division published data from 14 streamflow and 34 lake level stations.

Environmental impact assessment process

A total of 11 environmental impact statements were examined by the division to ensure that the hydrologic components of the environmental impact studies were adequate. Project proposals were screened to determine the need for hydrologic investigative work. Advice was provided to the environmental assessment secretariat and proponents/consultants on information needs for specific studies.

Table 10 — Breakdown of Responsibilities Saskatchewan Hydrometric Network

	Streamflow	Lake	Total
Canada	102	38	140
Canada-Saskatchewan	117	10	127
Saskatchewan	65	36	101
Total hydrometric stations	284	84	368

Operation planning division

The operation planning division provides a hydrologic service to the province in the areas of flow forecasting and water resources project operation planning. The division has an established expertise in hydrologic forecasting and reservoir operation planning.

Flow forecasting includes development of forecasting procedures for critical locations which are used to project future flow conditions.

Reservoir operation planning includes maintaining up-to-date information on control structure capabilities, and lake or reservoir characteristics. This information combined with flow forecast information enables the division to plan the operation of single or multiple use reservoirs for the benefit of all users.

Streamflow forecasting service

Spring runoff forecasts for most of the river systems in the province are made every spring to assist in planning for conserving and apportioning water from the snowmelt. The forecasts are based on fall and winter precipitation information and snow depth and water equivalent measurements.

A dry fall and a below average snowfall during the winter resulted in a below average runoff in the province in the spring of 1981.

Forecasting equations for several basins were updated during the past year as a part of an ongoing process.

Saskatchewan river operation

Spring runoff was below normal in the South Saskatchewan River basin and releases from Lake Diefenbaker were reduced to 45 m^3/s (minimum allowable) by mid-May. Heavy rain in the Alberta headwaters in late May and June caused inflows to Lake Diefenbaker to increase substantially and, as a result, the spillway at Gardiner Dam was opened twice in June to allow a total release of 600 m^3/s to the South Saskatchewan River. A rainstorm in July again caused Lake Diefenbaker inflows to increase and water was spilled for several days in early August (maximum release of 700 m^3/s). Lake Diefenbaker reached its maximum elevation of 556.85 m in late August, 0.01 m below the full supply level.

Operation of Tobin Lake was normal for most of 1981 with the exception of a period of several days in August when a spill from Lake Diefenbaker combined with high flows on the North Saskatchewan River necessitated a spill from Tobin Lake. The maximum release during this time was 1300 m^3/s.

No problems were encountered in either establishing or maintaining an ice cover on the South Saskatchewan River below Gardiner Dam following the fall freeze-up.

Qu'Appelle river operation

Operation policies for the Qu'Appelle River system are established by the Qu'Appelle operation board. The board met three times during the year. Day-to-day operations are carried out by the division within policy guidelines established by the board to provide maximum benefit for all water users throughout the Qu'Appelle River system.

Below normal runoff and abnormally high evaporation losses in May and June necessitated the diversion of 142 million cubic metres of water from Lake Diefenbaker to improve the water supply situation in the Qu'Appelle River Basin.

The control structures at Craven, Echo, Crooked and Round Lakes were closed in early March to conserve water on all the Qu'Appelle lakes. High evaporation losses during May and June were partially offset by frequent rains throughout July and August. This allowed the lakes, except for Round Lake, to be maintained within the desirable operating range for most of the recreation season. The control structures on the lakes were opened following the recreation season to lower the water level in the lakes in preparation for the 1982 runoff.

Boundary reservoir operations

No releases were made from Boundary Reservoir in the spring of 1981 because of the below normal runoff. Spring runoff resulted in a reservoir level of 558.6 m, 2.2 m below full supply level. Releases made during the year for consumptive downstream uses, combined with evaporation losses, reduced the reservoir elevation to 556.8 m prior to the 1982 spring runoff.

Cookson reservoir operations

The spring runoff in 1981 filled Cookson Reservoir to within 0.47 m of its full supply level of 753.0 m. Throughout the year, releases for international apportionment requirements and losses due to evaporation reduced the reservoir level to 751.9 m prior to the spring runoff of 1982.

Due to an above average snowpack in the East Poplar River basin, plans are made to operate the control structure on the reservoir for the 1982 spring runoff to ensure that Cookson Reservoir would fill while, at the same time, reduce downstream water levels.

Sediment studies

The division maintained its interest in a joint research program with Environment Canada in monitoring sedimentation changes on the South Saskatchewan River and Lake Diefenbaker. The purpose of the program is to monitor the river changes downstream from the dam and delta formation in Lake Diefenbaker. Sediment loading of the lake is also monitored. The surveys involve profiling and collecting bed samples at points along pre-selected cross-sections across the lake and river that are conducted at intervals of three to five years.

Two new ranges were established, 2.9 and 7.1 kilometres below Gardiner Dam to provide additional sedimentation information in the future. The sediment survey was not conducted during the summer of 1981.

Computer services

The use of computer technology within the branch increased significantly during the fiscal year. In addition to progressive developments in data management and hydrological techniques, the hydrology branch initiated a program to enhance its "Real Time Data" capabilities. This program entailed installation of remote sensing equipment at field locations throughout the province which transmits data by satellite to ground tracking stations. These data are then accessed by a micro computer recently acquired by the hydrology branch. The accessibility to real-time data is extremely important to the efficient management of the province's water resources.

Water rights branch

- administers and regulates the province's water resources by issuing licenses and permits for using and draining surface water, ground water and for hydro power generation;
- collects, compiles and provides information about surface and ground water resources;
- participates in regulating international and interprovincial streams;
- investigates and arbitrates problems and complaints arising from project operations; unauthorized drainage works and resultant flooding, flowing wells and drilling operations;
- assists in reviewing and approving wetland development proposals;
- provides support services to other branches of the department on environmental impact assessments, pollution concerns, Indian land entitlements, industrial water charges;
- assists in interpreting legislation and procedures.

Surface water division

Surface water administration

Surface water administration activities for January 1, 1981 to December 31, 1981 are summarized in Table 11.

During the report period the number of new project applications, projects authorized, new licences issues and temporary permits increased from the previous fiscal year.

Surface water projects which required substantial administration involvement by the division were: Ducks Unlimited's Cumberland Marsh, Ponass Lake, Middle Quill and Neale Edmunds projects; Saskatchewan Minerals Chaplin Lake and Ingelbright Lake projects; City of Melfort (Eagle Lake); Sybouts Sodium Sulphate project; Ponteix Water Users Association; Herbert Water Users Association; Chapleau Lake; Many Island Lake (Walsh Flats); Town of Eastend; Tatagwa Marsh; Village of Goodsoil, Eldorado Nuclear Ltd.; Humboldt Water Supply; Frenchman River; Swift Current Creek basins; and Eston-Kindersley Water Supply.

Requests for special operation of reservoirs were received for Junction, Dead Lake, Moosomin and Altawan Reservoirs.

Problem areas involving a number of water rights projects requiring investigation and studies included the Vanguard area, Consul area, Piapot (Bear Creek), Val Marie area and Gull Lake area.

Revisions to The Water Rights Act and Regulations were carried out within the branch during the year.

Table 12 shows the surface water projects authorized and licenced within the various drainage basins in the province.

International streams

Under authority of the Boundary Waters Treaty, the International Joint Commission recommended that the daily natural flows of Battle Creek, Frenchman River, Lodge Creek and the Souris River be divided equally between Canada and the United States. Computations on the first three streams are carried out by federal officials at ten day intervals during the open water season. On the Souris River, computations are carried out following spring runoff and at the end of the calendar year.

Table 13 shows international streams management between Canada and the United States during the 1981 calendar year.

Table 11 — Surface water project administration statistics

	1980	1981
New project applications	311	316
Project construction authorized	188	309
New licences issued	146	202
Licences transferred	70	58
Licences cancelled (abandoned)	124	9
Temporary water use permits	24	40
Operational complaint inspections and investigations	51	47

Table 12 — Drainage basins showing all authorized and licenced water development projects under the provisions of The Water Rights Acts to December 31, 1981.

Sub-basin report		Number of projects						
Drainage Basin								
Number	Name	Domestic	Municipal	Industrial	Irrigation	Miscellaneous	Total number of projects	* Total storage
1	Lodge Creek	52	1	0	43	1	97	25,330.0
2	Battle Creek	223	0	1	231	6	461	11,455.0
3	Frenchman River	450	1	0	241	15	707	196,337.4
4	Many Island Lake	125	1	0	37	0	163	1,543.5
5	Bigstick Lake	187	0	0	115	6	308	7,025.7
6	Hay Lake	15	0	0	17	0	32	566.1
7	Crane Lake	63	0	0	79	3	145	11,993.7
8	Skull Creek	25	0	0	27	2	54	3,639.7
9	Antelope Lake	42	2	1	27	4	76	1,370.7
10	Swift Current Creek	169	2	4	333	12	520	125,509.8
11	Old Wives (Johnstone) Lake	1177	11	4	660	31	1883	78,529.1
12	McRae Creek	18	0	0	5	0	23	388.3
13	Woodpile Creek	15	0	0	2	0	17	203.7
14	Lyons Creek	49	0	0	10	1	60	1,732.6
15	Coteau Creek	52	0	0	11	0	63	344.3
16	Whitewater Creek	149	1	1	45	2	198	2,261.0
17	McEachern Creek	51	0	0	21	0	72	874.5
18	Horse Creek	4	0	0	1	0	5	28.6
19	Rock Creek	5	0	0	1	0	6	18.5
20	East Poplar River	90	1	1	21	0	113	6,730.0
21	Poplar River	24	0	0	3	0	27	201.8
22	West Poplar River	3	0	0	2	1	6	1,210.5
23	Qu'Appelle River	730	43	22	389	78	1260	87,502.2
24	Souris River	247	21	2	128	23	421	105,913.3
25	Manitou Lake	104	1	0	16	2	123	1,377.5
26	Lenore Lake Group	11	5	1	19	0	36	501.8
27	Quill Lakes	39	4	1	16	15	75	15,265.2
28	Carrot River	36	13	0	31	7	87	29,191.8
29	North Saskatchewan River	543	17	13	234	58	865	86,679.4
30	South Saskatchewan River	669	33	13	495	20	1230	10,600,747.0
31	Assiniboine River	86	15	1	46	31	179	31,480.5
32	Swan Lake	2	0	0	3	0	5	15.7
33	Red Deer River (Saskatchewan)	16	9	2	9	13	49	80,450.8

Table 12 — Drainage basins showing all authorized and licenced water development projects under the provisions of The Water Rights Act to December 31, 1980 — (continued)

Sub-basin report		Number of projects						
Drainage Basin								
Number	Name	Domestic	Municipal	Industrial	Irrigation	Miscellaneous	Total number of projects	* Total storage
34	Churchill River	9	4	1	7	12	33	28,135.2
35	Athabaska River	0	1	0	0	0	1	.0
36	Great Sandhills Group	124	1	0	82	6	193	8,335.0
37	Willowbunch Group	238	2	1	78	9	328	5,692.9
38	Rush Lake	179	1	0	120	1	301	19,372.0
39	Wildhorse Lake	5	0	0	2	0	7	58.6
40	Climax Group	85	1	0	60	1	147	1,337.3
41	Taits Lake	59	0	0	43	3	105	4,715.5
42	Bluff Creek	16	0	0	2	0	18	234.5
43	Coal Creek	2	0	0	2	0	4	13.7
44	Paisley Brook	52	0	0	3	0	55	466.8
45	Big Muddy Lake	118	0	0	28	5	149	3,932.7
46	Missouri Group	59	1	3	23	0	88	2,887.7
47	Little Manitou Lake	13	1	1	12	6	33	729.4
48	Shoe Lake Group	39	0	0	43	5	87	1,581.1
49	Green Lake	1	0	0	0	0	1	20.4
50	Lower Souris River Group	68	8	2	31	15	124	23,454.7
53	Whitebear Lake	41	0	0	8	11	60	1,962.2
54	Coteau Group	16	0	0	1	4	21	686.0
55	Luck Lake	26	2	0	9	0	37	871.6
56	Goose Lake Group	83	2	1	40	6	132	2,831.2
57	Overflowing River	0	0	0	0	2	2	21,246.8
58	Kindersley Lake Group	100	3	1	32	15	151	15,018.7
59	Whiteshore Lake	26	0	1	11	0	38	325.8
60	Redberry Lake	13	0	0	3	3	19	4,048.1
61	Beaver River	2	1	1	4	29	37	64,667.4
64	Wollaston Lake	0	0	1	0	0	1	.0
67	Saskatchewan Lake	3	4	0	2	2	11	41.3
	Totals	6848	213	80	3942	464	11547	2,381,716.7
								11,729,089.7

* Dam^3

Table 13 — International streams administration

	Battle Creek	Frenchman River	Lodge Creek	Souris River
Calculated flows at the U.S. boundary (dam³)	8900	18,140	1260	22,300
Comparison to normal flow (o/o)%	27	21	3.4	12
U.S. share (dam3)	4450	9070	630	11,150
Delivered to U.S. (dam³)	5610	8300	407	15,400
Number of periods in deficit	6	7	9	0

Dam³is 1,000 cubic metres

Water power division

Legislative

During the 1981 spring session of the legislature, Bill Number 33 was passed which amended Section 16 of The Water Power Act. This amendment permits the Lieutenant Governor in Council to make changes to any rentals, royalties, fees, dues and charges which are fixed by rescinding, revoking, amending or varying any regulation made under Section 16(1)(j) of the Act or by making other regulations under that clause.

A recommendation was subsequently submitted to amend the regulations under The Water Power Act to increase the annual rentals charged for water power generation. This matter was still under consideration at the end of the year.

Hydroelectric generation during 1981

The total power by hydroelectric projects in the Province of Saskatchewan in 1981 was more than 2.9 billion kilowatt hours. This is almost 14 per cent greater than the power generated during 1980 and is due mainly to above normal flows in the summer months in the Saskatchewan River system. Hydroelectric power generated in the province during the previous five years was as follows:

1977 — 2,115,114,700 KWH
1978 — 2,560,981,900 KWH
1979 — 2,426,223,500 KWH
1980 — 2,559,875,000 KWH
1981 — 2,907,544,700 KWH

Table 14 outlines hydroelectric projects which operated during 1981. While precipitation on the South Saskatchewan River was below normal during the winter months, mild temperatures

Table 14 — Hydroelectric projects operating in the 1981 calendar year

Location	Island Falls	Wellington Lake	Waterloo Lake	Squaw Rapids	Coteau Creek	Charlot River
Licensee	Province of Saskatchewan	Eldorado Nuclear Limited	Eldorado Nuclear Limited	Saskatchewan Power Corp.	Saskatchewan Power Corp.	Eldorado Nuclear Limited
Capacity	125,000 H.P.	6,600 H.P.	10,000 H.P.	396,000 H.P.	252,000 H.P.	15,200 H.P.
Water source	Churchill River	Charlot River	Charlot River	Saskatchewan River	Saskatchewan River	Charlot River
Power use	Flin Flon Mines Creighton	Eldorado Nuclear Mines, and Uranium City	Eldorado Nuclear Mines, and Uranium City	Saskatchewan Grid	Saskatchewan Grid	Eldorado Nuclear Mines, and Uranium City
Power Generated in 1980 (megawatt hours)	550,900	28,520	25,060	1,227,194	1,042,550	33,320

maintained flows near normal for that period. During May, June and July precipitation and river flows were above normal. In September flows began to recede and by December they were below normal.

Precipitation on the North Saskatchewan River was below normal but flows remained normal due to mild weather during the winter. Flows were above normal in June and July and in September they began to diminish until they returned to normal in December.

From January until October precipitation on the Churchill River system was about 75 per cent of normal. In November and December the flows returned to near normal.

Precipitation in the Tazin Lake area has been below normal since 1978 and during 1981 this trend continued at about 75 per cent of normal. Tazin Lake levels reached near record low elevations. Temporary authorization was given to Eldorado Nuclear Limited to divert additional water to Tazin Lake by lowering the outlet of Ena Lake. Tazin Lake is the major water source for the Eldorado Nuclear hydro projects.

An application was received in September, 1981 from the Saskatchewan Power Corporation for the proposed Nipawin hydro project.

Drainage control division

The drainage control division was established during the fiscal year to administer The Drainage Control Act, proclaimed on January 1, 1981. Regulations under the Act were approved in August, 1981. Six new permanent and some temporary positions were approved for the division in the 1981-82 provincial budget, to supplement three existing permanent positions.

In April, 1981, an information pamphlet on the drainage control program was mailed to rural residents, municipalities and various regional government offices. Staff of the newly created division spoke at various meetings and conventions on interpretation of the legislation and procedures for obtaining drainage permits and resolving complaints related to drainage.

Regional drainage offices were established in Tisdale and Fort Qu'Appelle. Each regional office, staffed with a professional engineer and some temporary survey personnel, is primarily responsible for investigating drainage complaints.

A further expansion of staff and decentralization is being considered for 1982-83.

Drainage permits

Under The Drainage Control Act, a permit is required by any person for the construction and use of drainage works. Certain classes of drainage works are excluded in the regulations from requiring permits.

On an interim arrangement, the federal PFRA provides engineering surveys, designs and plans to individuals and small unorganized groups contemplating drainage.

Drainage proposals are evaluated to determine their possible effects downstream and the sufficiency of the outlet. Some proposals are referred for comments to other branches within the department and other government departments.

Table 15 summarizes drainage applications received from the date of approval of the Drainage Control Regulations, to March 31, 1982.

Table 15 — Applications for drainage permits

Applicant	Number of Applications Received	Designs and Plans Received	Permits Issued
Conservation and Development Areas	8	8	1
Individuals and Unorganized groups	96	10	0
Totals	104	18	1

Table 16 — Complaints

Complaints received	128
Complaints investigated	121
Complaints surveyed	70
Hearings requested	30

Complaints

The Drainage Control Act provides a mechanism to deal with drainage-related problems through a complaint procedure. Complaints received by the branch are investigated and, when necessary, the problem area is surveyed. In addition, any party to a complaint may request the department to conduct a formal hearing on the complaint.

The department is required to render a decision on a complaint within 18 months from the date the complaint is received. Where a decision is not compiled with an order can be issued requiring that certain remedial action be undertaken. To March 31, 1982 no hearings were conducted nor were any decisions rendered or orders issued.

Table 16 summarizes complaints received from the date of approval of the Drainage Control Regulations to March 31, 1982.

Watershed Areas and Watershed Commissions

The Drainage Control Act enables the minister to establish watershed areas and appoint a watershed commission for each area. Commissions would exercise the powers and duties under the Act, including issuing or denying drainage permits and dealing with drainage-related complaints.

Watershed areas will basically comprise major drainage basins. A watershed commission will be comprised of up to 13 members, all residents in the watershed area and representing municipal, agricultural, wildlife and other interests.

Watershed commissions have not yet been appointed. Issues for appointing Commissions are being addressed, including:

- number of members and representation;
- funding, including method for raising local funds required for costs of commissions;
- mandate of commissions, bearing in mind the province's overall responsibility for water resources management.

The government is giving consideration to appointing one commission on a pilot basis for two years to evaluate the effectiveness and acceptability of the program before deciding on further implementation.

Wetlands

Staff of the division acted on the existing technical advisory committee to consider agriculture-wildlife conflicts resulting from developing wetland areas. Activities of this committee included developing proposals to eliminate or mitigate these conflicts and making recommendations to the wetlands committee tc approve or reject proposed developments.

During the year, 21 new wetlands projects were submitted for review: 14 were investigated and cleared, one was withdrawn during the review process and six were still in the review process at March 31, 1981. Since the beginning of the wetlands review process in October, 1971, 407 projects have been introduced into the system, 308 were cleared, 48 were withdrawn and 51 are still under investigation.

The division also provides secretariat services to both the technical advisory committee and to the wetlands committee. The wetlands technical advisory committee cleared 20 projects under the rural municipalities channel clearing policy.

Ground water division

Overview

Drought conditions prevailed throughout parts of the province during the spring resulting in continued high activity in ground water resource development. Well drilling activities reached an all time high with over 5,000 drilling reports received. Applications for licenses to use ground water increased as municipalities drilled additional wells to augment present water supplies to meet the demand for water. Interest in irrigation projects using ground water continued to be high with some projects proceeding to the production stage. Requests for data from our computerized geohydrological data system increased over last year. Selected computer printouts were sent to several communities and consultants. A "Statistical Analysis System" package was used for retrieval of data from our geohydrological data system to prepare maps showing ground water potential and water levels. Table 17 shows a breakdown of administration activities carried out by the division.

Interim rights to use ground water were issued to Kerrobert, Humboldt, Grenfell and Nokomis for municipal purposes and to A. Regehr of Donovan, I. Saul of Semans, L. Sveinbjornsen of Wynyard and TransCanada Pipelines for irrigation purposes.

Flowing water wells

The division provided technical assistance on controlling a flowing well in the Grenfell area.

Table 17 — Ground water project administration statistics

	1980-81	1981-82
Applications for licences	96	113
Authorizations issued	78	91
Licences issued	54	102
Licences cancelled	3	8
Investigation permits issued	116	123
Probability reports (written and verbal)	253	250
Water well drilling machine registrations	147	141
Drilling reports received		
Test holes	1317	1895
Water wells	3079	3431
Total	4396	5326
Drilling breakdown by purpose		
Domestic	4160	4969
Municipal	195	330
Industrial	33	5
Irrigation	8	22

Geohydrological services

The division provided geohydrologic services to the department's environmental assessment secretariat by reviewing the geology and ground water components of project proposals, baseline studies, overviews and environmental impact statements for PCS Bredenbury, Wapiti Valley Regional Park, Amok Claude Lake, Procor Brine Pond, Waddy Lake Goldmine, Gunner-Loredo Tailings, Cluff Mining, Gulf Minerals-Collins Bay, Saskatoon Chemicals, Asasmera, Flin Flon Mines, PCS Research Project Guidelines, IPSCO dust and disposal sites, TransCanada Pipelines (TCPL) irrigation, Heavy Oil Project, Nesa Lake, Flin Flon Mines-Bootleg Lake, Bienfait Mine Expansion Reclamation, Ducks Unlimited-Crane Lake.

The division provided the department's environmental protection service (EPS) with geological support service and expertise on Prince Albert PCP containment, Glaslyn PCP Problem, Federated Pioneer Limited PCB, Weyburn Lagoon, SPC Poplar River project, Regina Aquifer Study, Regina Landfill, IPSCO ground water monitoring, Moose Jaw ground water monitoring, IMC expansion.

The division investigated the complaint of lower water levels in the Pilot Butte area as well as complaints in the Stoughton, Arran, Earl Grey, Disley, Ebenezer, MacNutt and Regina Beach areas concerning well interference.

Proposed irrigation projects using ground water were reviewed from the Kisbey, Vanguard, Wynyard, Fir Mountain, Blaine Lake, Rockglen, Carievale, Wolseley, Radisson, Lemsford, Semans, Dinsmore, Swift Current and Donavon areas.

Complaints concerning well drilling contractors were received and reviewed from the Outlook, Prince Albert, Hague, Togo, Veregin, Grayson, Moosomin, Willow Bunch and Jansen areas.

Interim Subsidiary Agreement on Water (ISAW)

The division had extensive involvement in the ISAW agreement ground water projects for the Estevan Valley, Hatfield Valley and Judith River formation aquifer systems.

Prairie Provinces Water Board (PPWB)

Staff from the ground water division acted on the PPWB's committee on ground water and attended meetings at Winnipeg and Edmonton. Staff provided the PPWB with data to assist on the study of water in the Manville formation along the Alberta border.

Geohydrologic data bank

The division completed the first printout of all the water well data in computerized system. Studies are currently under way to reduce the volume of space required to store the 70,000 well records; "microfiche" is being investigated as a viable alternative. Other studies are being undertaken for a proposed observation well network to augment the system presently operated by the Saskatchewan Research Council to draft a policy on the use of ground water for irrigation projects and to draft The Ground Water Conservation Act and Regulations.

Qu'Appelle implementation branch

- under the direction of an eight member federal-provincial Qu'Appelle Valley management board the branch initiates and coordinates development in the Qu'Appelle Valley set down in the Canada-Saskatchewan Qu'Appelle Agreement. Public consultation takes place through a 15 member public advisory council.

Implementation

The Qu'Appelle implementation office entered its seventh year of operation. The office was initially located in Fort Qu'Appelle to encourage regular communication between the implementation staff and residents of the valley. The implementation staff is made up of the director, an engineering coordinator, an administrative officer, an information officer and a stenographer.

Information

Several issues of the Qu'Appelle information newsletter covering a wide-range of topics and a number of informational brochures were published. The 1982 Qu'Appelle calendar was printed and distributed to valley residents. Regular progress reports were prepared as a means of informing persons directly involved in implementation work, to assist in coordinating activities and to provide detailed information on the status of each project.

Environmental improvement

There is continued public concern about the effect of water quality on recreation in the Qu'Appelle Valley. An improvement in water quality is essential for further development of the tourism industry.

Investigations continued on the lake eutrophication process and means of improving water quality.

A literature review of algae harvesting methods indicated a potential to harvest and process algae for fertilizer. A pilot project was proposed for 1982-83 to explore algae harvesting methods with the view of possibly carrying out a small harvesting project in 1983-84.

The program to monitor water quality at certain key locations was continued to assess changes in water quality and the effectiveness of phosphorus removal works constructed under the Qu'Appelle Agreement. Data indicated significant amounts of phosphorus are still being retained in the Fishing Lakes. Phosphorus regeneration within the lakes is a major factor affecting water quality. The continued deterioration of water quality in the Fishing Lakes has been halted by phosphorus control works; however, any visible improvements in water quality may require more time to occur or may never be readily apparent. The monitoring program will continue to provide a better understanding of nutrient levels.

Sediment cores from Pasqua Lake were analyzed to evaluate historical changes in aquatic growth and algae. The fossil remains show the lake has historically been eutrophic but the level appears to have increased since early settlement. Further historical research is planned for 1982-83.

Municipal waste treatment

Financial assistance of up to 50 per cent was provided for treatment facilities at Moose Jaw, Fort Qu'Appelle and Katepwa Lake to remove phosphorus in the effluent.

Construction commenced on the combined effluent irrigation system and slow rate infiltration system for the City of Moose Jaw. Work was approximately 85 per cent complete by March 31, 1982.

The irrigation project will dispose of approximately 60 per cent of the effluent volume. The remaining 40 per cent will be disposed of by an infiltration pond or by expansion of the irrigable area. A pilot infiltration pond is scheduled to be constructed in 1982-83 and will be tested to confirm the feasibility and cost of this method of disposal.

Based on recently completed investigations, Regina is planning a $5.5 million addition to their tertiary treatment plant. This second phase will increase the effectiveness of phosphorus removal, provide a means for disposing of the resulting sludge and reduce the operating costs. The present plant removes 80-85 per cent of the phosphorus from Regina's effluent before it is discharged to Wascana Creek.

Construction of the Fort Qu'Appelle advanced waste treatment plant began in July 1981, and the plant is scheduled to be in operation in the summer of 1982. In the physical-chemical treatment plant lime or alum is added to the effluent to precipitate out the phosphorus. The resulting sludge will be disposed in the landfill site.

The Village of Katepwa and the R.M. of Abernethy have jointly agreed to construct a two cell sewage lagoon with 50 per cent assistance

provided under the Qu'Appelle Agreement. The two cell lagoon will dispose of liquid waste from the developments surrounding Katepwa Lake through a lagoon with sufficient capacity to allow effluent to evaporate rather than be discharged to the Qu'Appelle River system. Similar facilities will be constructed next year at other lakes.

Livestock pollution

During 1981 pollution control works were constructed for 30 livestock operations along Wascana Creek, Moose Jaw River and the Qu'Appelle River between Buffalo Pound Lake and Craven. Eighty-nine works have been constructed to date.

Inspections were completed on 120 livestock operations to determine potential pollution problems. Engineering surveys were carried out in a number of cases. Plans for control works were finalized and construction approvals were obtained for livestock operations along Loon Creek, Jumping Deer Creek, Pheasant Creek and Last Mountain Lake area. The program will be accelerated in 1982 to complete control works upstream of Pasqua Lake.

Conveyance

The spoil along the improved channel between Craven and Last Mountain Lake was levelled and seeded to grass.

Negotiations continued for the voluntary purchase of private lands for conveyance and fish migration works between Mission and Echo Lakes. Discussions also continued with the Qu'Appelle Valley Indian Development Authority for lands required for conveyance improvements west of Pasqua Lake. Continued construction is planned for next year where the land can be obtained.

Moose Jaw flood protection

The spoil disposal area along the Moose Jaw River, where channel improvements were undertaken, was cleaned up and seeded to grass.

Four properties were acquired under a program to purchase seriously flooded properties along the Moose Jaw River in the River Park, Wellesley Park, Churchill Park and Kingsway Park residential areas.

Mercury contaminated sediments along Thunder Creek, were removed and placed in a safe disposal area on CP Rail property. The project was funded by CP Rail. The disposal area will be covered with topsoil, grassed, landscaped and turned over to the provincial government for possible future use by the Wakamow authority.

Land use planning

The special planning area commissions have formulated land use policies to guide future development and land use in the Qu'Appelle Valley. These policies and plans were made available to valley residents and public meetings were held to obtain views and comments of the landowners.

Alternate arrangements for administration of the final land use plan and development controls were discussed by Saskatchewan Urban Affairs and each special planning area commission. Continuation of the land use program is supported and it is proposed that district planning commissions be established when the present commissions terminate on Augusut 31, 1982. The district planning commissions would have the authority to make decisions on land use or zoning changes without the approval of the minister of urban affairs in much the same manner as other municipalities across the province.

The land use planning staff continued to provide advisory services and assist the commissions in reviewing development and subdivision proposals.

Recreation and tourism

Historic recreation corridor

Final management plans were completed last year for major waterfowl areas at Eyebrow Lake, Valeport Marsh and the west end of Buffalo Pound Lake. Construction will be undertaken in 1982 with the majority of the $1.5 million funding provided by Ducks Unlimited.

Dykes on the Rankin fish spawning area at the west end of Buffalo Pound Lake were seeded to grass. The project is now completed and the first fish spawning operations will start in 1982.

During the past fiscal year extensive upland wildlife habitat improvements such as browseway cutting, tree and forage crop planting, watering site construction and fencing were carried out at Pheasant Creek, Highway No. 9 East, Marquis Coulee and Mission Lake.

The fish and wildlife program is progressing favourably toward completion by 1984 when the joint agreement is scheduled to terminate.

A water management plan is being prepared for the Qu'Appelle system outlining the water requirements for fisheries and wildlife developments, optimum water levels and a schedule for water releases. The report will be useful in planning the system's operation to meet demands of various users.

Tourism facilities

During 1981 development work was started on the Bird Point recreation area on Round Lake. A bath changehouse was constructed and a boat launch, playground, parking lot and landscaping of the area in 1982 will complete the planned development.

The 104 km self-guided auto tour to points of geological interest in the Fort Qu'Appelle area was completed and officially opened in October 1981. A brochure outlines the geological history of the valley and travel directions to each stop.

A 13 km section of resort was completed along the valley bottom west from Highway No. 9. The remaining 20 km to Tantallon will be completed in 1982 to encourage tourist travel along this section of the Qu'Appeley Valley.

Alternate land use

Cottage lots were purchased at Bird Point on Round Lake to construct a park. Negotiations continued for the purchase of two remaining properties.

Incentives program

Under the Qu'Appelle agreement loans and incentives are available to encourage private commercial operators to expand, modernize and locate in the valley. A grant is available for developments which provide improved or expanded accommodation, food services and recreation facilities. Under this program a motel and restaurant in Craven was officially opened in January, 1982. The Country Squire Hotel in Fort Qu'Appelle is being expanded and modernized and a grant was approved for a new 10 unit hotel at Regina Beach.

Interest in the program is increasing and a number of other proposals for future development of recreation related facilities were under financial review at year end.

Community development assistance

A municipal development plan was completed for Regina Beach and Buena Vista. It is an important part of the land use planning program and will guide future development of the village and recreation facilities.

The Village of Tantallon has prepared a concept plan for a $30,000 recreation area. The planned work for 1982 includes campsites, toilet facilities, water service, a trailer sewage disposal station, grading and gravelling of internal roads and a parking lot. Financial assistance is provided under the agreement to selected valley communities to assist them to function more efficiently as tourist destination areas.

Environmental Assessment Secretariat

R. L. Kellow
Executive Director

Environmental assessment secretariat

- screens development proposals to determine need for environmental impact studes;
- develops guidelines for impact studies submitted for environmental impact statements;
- coordinates government participation in the impact assessment and review process;
- coordinates public participation in the impact assessment and review process;
- monitors approved projects to ensure compliance with presented mitigative measures and maintains contact with regulatory agencies involved.

Guidelines development

During the 1981-82 fiscal year, the secretariat completed a set of guidelines in order to mitigate the impact of road development in rural areas on the physical, biological and human enviroment of Saskatchewan. The secretariat also developed a set of guidelines to encourage the heavy oil industry to collect environmental information in the course of their thermal heavy oil pilot operations and to provide guidance regarding the type of environmental information considered most valuable.

In addition to these guidelines, the secretariat also started development of two new sets of guidelines.

1. Guidelines for Environmental Protection During Mineral Exploration in Northern Saskatchewan; and
2. Guidelines for Development and Reclamation of Sand and Gravel Pits.

It is expected development of these guidelines will be completed during the 1982-83 fiscal year.

Impact assessments

During the 1981-82 fiscal year, 50 new project proposals were received by the secretariat. The status of the various project proposals received or under review during the year is:

Table 18 — Projects requiring an EIA or undergoing screening at year end

Proponent	Project
DNS — Project Management	Cumberland Lake Water Levels Control Structure
DNS — Project Management	Cumberland House — Amisk Lake Road
Saskatchewan Highways and Transportation	Relocation of Hanson Lake Road (Hwy. 106) in Big Sandy area
Esso Minerals Canada Ltd.	Uranium Mine and Mill at McMahon Lakes (Midwest Lakes Project)
Gulf Minerals Canada Ltd.	Expansion of Uranium Mining near Collins Bay, Wollaston Lake
DNS — Project Management	Road from Highway 105 to Stony Rapids
Canadian Occidental Petroleum Ltd.	Uranium Mining (McClean Lake Uranium Developments)
SPC	Northern Grid
Amok Ltd.	Claude Ore Body Uranium Mining
SPC	Courval Thermal Plant
SPC	Diefenbaker Lake Thermal Plant
PCS	New Potash Mine, Bredenbury Area
Husky Oil Limited	Heavy Oil Upgrader
SPC	Lignite Mining, Rockglen/Fife Lake Area
SPC	Coal Transportation Alternatives
Saskatchewan Highways and Transportation	Highway No. 41, Wakaw to Melfort
Peter Miller	Placer Gold Mining
Saskatchewan Highways and Transportation	Highway No. 55 — Green Lake
Valley Estates	Snoasis Valley Development
Saskatchewan Highways and Tansportation	Fir River Road
Saskatchewan Power Corporation	Western Grid
Department of Tourism and Renewable Resources	Cypress Hills — Resort Development
Eldorado Nuclear Ltd.	Ena Lake Water Transfer
Saskatoon Chemicals	Sodium Chlorate Plant Expansion
Saskatchewan Highways and Transportation	Highway No. 8 — Qu'Appelle Valley
City of Melfort	Eagle Lake Project
Kenergy Resource Corporation	North Saskatchewan River — Gold Project
SPC	Transmission Line — Missinipe to Grandmother's Bay
Amok	Claude Lake Experiment Pit
Energy Resources Canada Ltd.	Upper Waddy Lake — Gold Development
Sunshine Developments	White City Industrial Park
Prince Albert Pulpwood Ltd.	Hague Creek Improved Bush Road
City of Lloydminster	Storm Discharge Channel/Stream Course Discharge
SPC	Rural Gasification
Ducks Unlimited	Neale Lake Project — Development Project for Waterfowl
Ducks Unlimited	Wellington Marshes — Development Project for Waterfowl
SERU Nucleaire (Canada Ltd.)	Winter Road to All-Weather Road — Waterbury Lake
Village of Ceylon	Water Supply Project
Saskatchewan Highways and Transportation	Highway No. 13 — Hazenmore to Cadillac

Table 19 — Projects screened — impact assessments not required

Proponent	Project
International Minerals (IMCC)	Plant Expansion
Esso Chemicals Canada Ltd.	Fertilizer Distribution Centre
SPC	Transmission Line Conversion
Saskatchewan Highways and Transportation	Craven Landslide
Husky Oil	1981 Thermal Pilot Projects
Saskatchewan Highways and Transportation	Highway No. 1 — Junction 32 to Webb Access — Twinning
Transport Canada	Prince Albert Airport — Runway Expansion
Keith Project Management	Bar G Ranch Estates
Petro Canada	Dual Pipeline System — Kerrobert and Cactus Lake
SaskOil	Co^2 Extraction Pilot Project
SPC	Cactus Lake Natural Gas Service Pipeline
Kalium Chemicals	Plant Expansion
Saskatchewan Agriculture	Moon Lake Irrigation Project
Saskatchewan Mineral Resources	Buffalo Narrows Peat Fuel Demonstration Project
Ducks Unlimited	Farrell Project — Development Project for Waterfowl
Ducks Unlimited	Wiggins Project — Development Project for Waterfowl
Saskatchewan Highways and Transportation	Highway No. 37 — Climax to Frenchman River Valley
Ducks Unlimited	Slough Creek Project — Development Project for Waterfowl
St. Gregor South CDAA	St. Gregor Drainage Project
Saskatchewan Research Council	Use of Higher Grade Ore in Multi-Purpose Facility
SPC	Elkink Transmission Line
Hudson's Bay Gas and Oil	Lashburn Huff and Puff Pilots
Cargill Grain Company	Oilseed Processing Plant — Melfort
Asamera Oil Corp.	Feasibility Studies Technique for Borehole Mining
Asamera Oil Corp.	All Weather Road
Department of Northern Saskatchewan	Southend Airstrip
TransCanada Pipelines	Looping Program
Echo Bay Developments	Cottage Subdivision at Delaronde
Saskatchewan Highways and Transportation	Highway No. 13 — Meyronne to Hazenmore
Saskatchewan Housing Corporation	Crutwell Land Assembly
City of Regina	Storage Silo for Lime
Saskatchewan Mineral Resources	Grassland Park — Oil and Gas Exploration (Phase 1)
Ducks Unlimited	Cherewyk Project — Development Project for Waterfowl
Canadian Sunday School Mission	Dallas Valley Ranch Camp
Husky Oil	Golden Lake South Waseca Oxygen Fire Flood Pilot Project
Saskatchewan Highways and Transportation	Highway No. 21 — Reconstruction
SPC	Transmission Line — Coteau Creek to Swift Current

Table 20 — Assessment process completed and projects approved

Proponent	*Project*
SPC	Transmission Line — Assiniboia to Swift Current
Flin Flon Mines Ltd.	Gold Mining and Milling Operation — Creighton Area
Ducks Unlimited	Crane Lake Project — Development Project for Waterfowl

During the 1981-82 fiscal year, there were no projects, for which an environmental impact assessment was carried out, that were not approved.

Table 21 — Projects deferred or cancelled

Proponent	Project
Esso Resources Canada Ltd.	Heavy Oil Recovery — Cold Lake
Eldorado Nuclear Ltd.	Beaverlodge Expansion Program
SPC	Choiceland/Forks Hydro Site
Cayo Development Ltd.	Hidden Valley Resort
Missi-Island Mines Ltd.	Limestone Mining — Pinehouse
SPC	Transmission Line — Island Falls to Squaw Rapids

Other Activities

In addition to the normal review of projects through the environmental assessment review process and the development of guidelines for various activities, the secretariat also had input into several other project/activities during the 1981-82 fiscal year. Such projects/activities include:

- review of reclamation plans for coal mining areas;
- initial development of a background paper on environmental issues concerning the heavy oil industry;
- evaluation of terms and conditions of approval for northern roads;
- initial preparation of a summary of regulatory requirements;
- revision of project proposal guidelines.

Policy, Planning and Research Branch

H. S. Maliepaard, Director

Policy planning and research branch

- develops and coordinates environmental planning and research programs;
- develops policy guidelines for resource development and management;

Mackenzie River Basin task force

The task force met regularly during this final year of the three-year study jointly funded by Canada, Saskatchewan, Alberta and British Columbia. This study, designed to provide baseline data on water and related resources in the Mackenzie River basin, will improve evaluation of the effects of future water-related developments. The final report was released in February, 1982.

Athabasca Sand Dunes study

The Saskatchewan Athabasca Sand Dunes, south of Lake Athabasca, were identified as a sensitive area within the Mackenzie River basin. As part of the Mackenzie River basin study, the Athabasca Sand Dunes study is designed to determine the sensitivity of the sand dunes environment to possible changes in water levels and flows which could result from water resource developments in the Mackenzie River basin. The final report was released in February, 1982.

Ecological reserves

The Ecological Reserves Act was passed by legislature June 3, 1980, and proclaimed September 12, 1980. The purpose of an ecological reserve is to protect unique or representative features of Saskatchewan's natural environment.

During the summer, evaluation of candidate ecological reserves continued. Detailed reports on ten areas, to be finalized in the next fiscal year, will be used to establish a priority list for designating ecological reserves. Preliminary investigations of an additional seven areas were made. Four of these areas would be suitable ecological reserves.

Hazardous chemicals

Persistent requests by the department to federal health and welfare for health and safety information on a number of chemicals improperly tested by the Industrial Biotest Laboratories (IBT) in the United States resulted in a significant improvement in receipt of technical information during the year. Concerns persist over a number of chemicals. Among these are picloram (herbicide), triclosan (antiseptic agent), synthetic pyrethrins (used in insecticides) and calcium hypochlorite (water treatment agent). Continued attention will focus on replacement studies under way for IBT chemicals particularly important in Saskatchewan.

Increasing interest centres on hazardous chemicals which may concern consumers. Department liaison with Saskatchewan Consumer and Commercial Affairs in this area has been increased.

Coal land reclamation

Public concern about reclamation of strip-mined land was expressed at the first board of inquiry of the Poplar River mine in 1974. The second board of inquiry held that reclamation must aim to restore strip-mined lands to prior levels of agricultural productivity.

The branch was represented on a government committee which developed a coal policy in 1978 which stated that land reclamation must follow strip-mining.

In 1979 guidelines for reclamation were developed in response to expansions of exisiting coal mines in the Estevan area. These guidelines were further refined in 1980 and applied to the Saskatchewan Power Corporation's coal mining operation at Poplar River.

To develop a comprehensive reclamation program in the Estevan area, the branch began in 1981 to review relevant legislation and reclamation already carried out in the area. A reclamation strategy for the Estevan area is being developed.

Land use policy

In 1977, the government appointed a nine-member land use policy committee to advise on land use policy development and to direct public input into the policy development process. This committee represents local government, agriculture, recreation, resource development and environmental organizations. Staff support for the committee is provided by the branch.

Activities directed towards developing a provincial land use policy continued in 1980-81. A summary report of 11 public meetings held in southern Saskatchewan in February, 1981 was distributed. The purpose of the meetings was to inform people about the work of the committee, and to further discuss implementation of land use policy.

The committee prepared a draft final report and recommendations which will be submitted to the government in 1982-83.

Mines waste research secretariat

The mines waste research secretariat was established this year to initiate and coordinate research into uranium and potash waste management.

Uranium research

Eight research projects were contracted to investigate various environmental facets of two abandoned uranium mining/milling sites in the Uranium City area. These include:

- a study of the effects of uranium tailings on fish populations in Beaverlodge Lake, particularly migration and transfer of radiochemical elements through the food chain;
- a study of revegetation of uranium tailings at the abandoned Gunnar Mine;
- a study of the ability of northern lake mosses to neutralize acid waters and absorb radionuclides at the abandoned Lorado mill and Nero Lake;
- the movement of radionuclides in surface and ground water at Nero Lake and between Nero Lake and Beaverlodge Lake. This project involved extensive drilling and trenching to establish the ground water regime of the Lorado tailings and the surrounding area; and geochemical analysis of lake and ground water;
- an inventory of northern vegetation on and near uranium tailings;
- a survey of revegetation species and techniques in tolerance experiments for uranium tailings in Saskatchewan;
- a study of water chemistry and aquatic organisms in the flooded open pit at the old Gunnar Mine; and
- laboratory experiments on the effects of water neutralization on mosses growing in acid lake waters adjacent to the abandoned Lorado tailings.

Interim or final reports on these studies were completed during the fiscal year.

Potash research

Initial activities consisted of developing parameters for licensing potash mines. In addition, a research program was developed for implementation in the next fiscal year.

Administration Branch

R. P. Knoll, Director

Administration branch

- provides department support services for accounting, purchasing, stenographic, filing, mailing, library, drafting, personnel, training, systems, and computer operations;
- maintains operations for the minister, deputy minister, and two executive director offices;
- provides management advisory services to branches and secretariat services to interagency boards and committees;
- co-ordinates preparation of budget and legislation for department;
- collects all department revenues under federal-provincial agreements, licence fees and water use charges.

Accounting and purchasing

This section was responsible for all central accounting of the department. This included processing all expenditures, such as payroll, purchase of all materials and supplies, and processing of travel and sustenance claims, as well as the collection of all revenue.

The addition of a new position last year has allowed the section to also focus on budgeting and inventory control. All departmental accounting records and statements are also maintained here.

Steno services

This section has a staff complement of 16 and provided stenographic and receptionist services to all employees in the department. The services provided included the operation of a Micom word processor for production of many of the larger reports and repetitive documents.

The section has been organized as a decentralized pool, with secretarial positions designated for each branch director, but under central supervision.

Records, postal and library services

This section provided centralized filing, mail and library functions for the department.

Staff of the section received and delivered all incoming mail, processed all outgoing mail, operated a small blueprinting machine and maintained the department's centralized records system.

The library subscribed to all periodicals for the department, purchased books, reports and pamphlets for staff use; obtained inter-library loans, and co-ordinated department staff requests using the provincial library computer search program.

Drafting services

This section was responsible for drafting and graphic requirements of the department. The drafting of drainage complaint plans, required under The Drainage Control Act, resulted in increased drafting requirements during the year.

Graphic displays of special note prepared for water pollution control branch included the Western Canada Water and Sewage Conference Convention — Algae and Microscopy display in Saskatoon and Odour Control Workshop in Melfort.

The preparation of a series of complex monochrome maps for ecological reserve studies throughout the province was also started.

Personnel and training

The department filled 37 permanent positions during the year. In addition, 108 temporary, casual and part-time appointments were made; the majority were students hired for the summer months.

A personnel administrator position was established through reclassification to assume responsibility for department personnel and training functions.

Systems services

This section was responsible for coordinating all computer systems in the department and conducting systems studies to improve effectiveness and effiency of department operations. The Saskatchewan Revenue Supply and Services systems centre was contracted to conduct an evaluation of word processing requirements for the department.

Table 22 — Statement of expenditures and revenues for the fiscal year ending March 31, 1982

Saskatchewan Environment's operations are financed out of general revenues of the province in accordance with a budget approved by the legislature. Spending for the fiscal year ending March 31, 1982, was as follows:

Expenditures

Administration Branch	$1,072,905
Public Information and Education Branch	676,054
Policy, Planning and Research Branch	382,853
Air Pollution Control Branch	226,038
Water Pollution Control Branch	855,360
Land Protection Branch	835,250
Mines Pollution Control Branch	486,143
Mines Waste Research Secretariat	463,890
Enviromental Assessment Secretariat	386,594
Hydrology Branch	2,598,991
Water Rights Branch	682,257
Qu'Appelle Implementation Branch	569,851
Treaty Indian Land Entitlements	339,732
Grants to Organizations for the Purpose of Advising the Minister of Environment on Enviromental Concerns	107,240
Total	$9,683,178

Saskatchewan Environment collects licence and permit fees under The Water Rights Act, The Ground Water Conservation Act and The Drainage Control Act; collects charges for water use under The Water Resources Management Act and collects rentals for water use under The Water Power Act. It also receives revenues from other governments for work done or services provided under intergovernmental agreements.

These revenues are turned over to Saskatchewan Finance by the department.

Revenues

THe Water Rights Act — fees	$ 9,035
The Ground Water Conservation Act — fees	4,790
The Drainage Control Act — fees	2,200
The Water Resources Management Act — water charges	180,807
The Water Power Act — rentals	1,214,937
Other Governments — Canada	1,122,690
Total	$2,534,459

Public Information and Education Branch

G. M. Reamsbottom, Director

Public information and education branch

- replies to inquiries and provides information about the policies, programs and activities of the department;
- fosters public involvement in environmental assessments, public inquiries and environmental policy making and protection projects;
- cooperates with educational institutions and agencies in the development and administration of environmental education programs.

General

Publicity programs were developed in cooperation with other departmental branches to promote public awareness of Saskatchewan Environment's mandate to protect the environment. These included displays, publications, workshops, advertising and audio-visual programs and news releases.

The popularity of environmental education programs within the school system continued to grow. Two significant new activities initiated during the year were the Environmental Discovery and Landscapes programs.

Information division

News releases

Division staff prepared 106 news releases for distribution to the news media. Several joint releases were issued in cooperation with Environment Canada and various provincial government departments. Special efforts were made to keep the public informed on the cleanup of major spills of hazardous substances, major environmental impact assessments and water supply and quality problems.

Advertising and public announcements

Radio and newspaper advertising was used to encourage participation in public reviews of environmental impact assessments for 39 proposed developments. These included public reviews for a project proposal by the Saskatchewan Power Corporation to build a transmission line from Assiniboia to Swift Current, a gold mining and milling operation by Flin Flon mines and a Ducks Unlimited waterfowl development project at Crane Lake.

Branch staff also developed a major print and electronic media advertising program to increase awareness of new laws and programs to protect the environment. Three 30-second television commercials followed by an additional 60-second commercial publicized spill control, air and water pollution control, environmental assessment and water management programs. Print advertisements on these programs gave further details.

Pitch-In '81

Pitch-In '81 was held May 11-17, 1981. The campaign has been undertaken in Saskatchewan since 1975 by Saskatchewan Environment in cooperation with Outdoors Unlittered, a non-profit western Canada anti-litter organization. The primary objective of the annual campaign is to stimulate public participation and interest in litter control and community beautification projects.

Information kits on the program were distributed to schools, municipalities, native groups, industry, trade unions and the media inviting them to organize and support litter clean-up projects in their communities. The department donated 75,000 litter bags, an increase of 5,000 over 1980.

During the 1981 campaign approximately 1,400 projects were carried out compared with 1,100 the year before, a 25 percent increase, and a 366 per cent increase over 1975 when the program started. It is expected the number of projects will level off in the coming years.

A certificate of appreciation was sent to each participating group.

Bag-It '81

The Bag-It campaign, an extension of Pitch-In, encouraged the use of car litter bags by the motoring public. More than 500,000 car litter bags were distributed through credit unions, insurance offices, the Saskatchewan Motor Club, tourist information centres, government departments, libraries and other agencies and organizations.

Special projects

Spill control workshops

Spill control workshops were held in 11 Saskatchewan communities during the winter and spring. More than 600 people attended the

workshops which reviewed spill response procedures and the roles of municipal, provincial, and industry officials when a hazardous substance is spilled or leaked into the environment. The workshops were conducted by a member of the spill response team. Branch staff organized and publicized the workshops.

Flood damage reduction

Information meetings were held in Weyburn and Swift Current in conjunction with Environment Canada. The meetings were designed to explain the objectives of the Federal-Provincial Flood Damage Reduction Program, and to hear concerns about the program from local residents.

Hazardous waste management symposium

A major symposium on hazardous waste management in Saskatchewan was planned for April 1982. Branch staff organized the symposium which was co-sponsored by Saskatchewan Environment, and the Saskatchewan associations of urban and rural municipalities. Industry, transportation and research organizations, local and provincial government agencies and environmental and special interest groups were invited to send delegates to the symposium.

The program included an overview of the hazardous waste problem in Saskatchewan and other areas, a discussion of future options and workshops on hazardous substances, emergency response and the roles of municipal, federal and provincial governments.

Five fact sheets on various aspects of hazardous wastes together with a display were developed for the symposium.

Water conservation program

A severe drought during spring 1981 prompted development of a water conservation campaign to promote public awareness of the need to conserve water, and to suggest easy but effective methods for wise water management.

An information package containing samples of shower restricters, decals and water conservation pamphlets was sent to 187 communities. Close to 40 communities participated in the program, and 70,500 shower restricters, decal and brochures were distributed. Radio and print ads were also developed for the program.

New publications

During the year the branch developed publications including The Pesticide Tradeoff which explored the use of pesticides; and Water, which described the use and management of the province's water resources. Work was also initiated on a Hazardous Substances booklet.

Four issues of the Clearwater Reporter were produced during the year. The newsletter is directed towards water and sewage control operators.

Inquiries

Staff answered more than 400 inquiries for general information on the environment. In addition, 11,000 copies of The Pesticide Tradeoff and 2,500 spill control information kits were sent out in answer to specific requests. About 30 requests for environmental education materials were handled each week by the environmental education division.

Education division

Environmental discovery program

The environmental discovery program was introduced in Saskatchewan for the first time in 1981. Two biology students from the University of Saskatchewan visited schools, summer camps and provincial parks from May to September, conducting one-half to full-day workshops for teachers, students, camp leaders and campers throughout Saskatchewan. The idea was for everyone participating to have fun, to become more concerned about nature and to discover more about the environment in which we live. A secondary objective was to give teachers and camp leaders organizational tips and program ideas for working with children outdoors.

Seven activities and studies were selected and used in the program.
They were:

1. **Soil** — The study introduced the various types and properties of soils and promoted a greater understanding of the importance of soil as a life support system.
2. **Field/Forest** — A small area of field or forest was explored to investigate plant and animal life and to discover the interactions which occur within a natural setting.
3. **Insects** — The study emphasized observation and identification and encouraged further investigation.
4. **Aquatic Habitat** — Plant and animal life in a pond or stream was examined to study the interrelationships existing in an aquatic community.

5. **Environmental Games** — The games highlighted predator/prey relationships, animal survival techniques and peoples' impact on the environment.
6. **Fallen Log Post Mortem** — A decaying log was located and carefully dissected to investigate such things as fungi growth, animal inhabitants and wood fibre deterioration.
7. **Mini Beast Safari** — Mini beast safaris turned everyone into seasoned hunters/trackers/observers so they could participate in the wildlife adventures surrounding them.

Several requests for modified programs were accommodated.

During the months of May and June the emphasis was on school visitations throughout the province. The environmental discovery team spent one week in each of the seven education regions. During July and August the team visited summer camps and provincial parks.

Bookings were handled on a first-come, first-serve basis with preference given to requests from schools outside the major urban centres of Regina and Saskatoon where outdoor and environmental education programs already exist. Participants and organizers rated the program as excellent. An estimated 4,150 people participated in the program in just under four months.

SNOOP

SNOOP greeted Saskatchewan primary students for the second year when they returned to school in September, 1981. This fictitious character is featured in a monthly series of environmental education materials mailed to elementary schools from September to June of each school year. The program is designed to familiarize children with all aspects of the environment in which they live, increase their concern for nature and sharpen their skills of inquiry.

The number of teachers using the SNOOP program increased from 2,400 in 1980-81 to 3,500 in 1981-82. Each issue includes a large wall calendar, a teacher's guide and a set of five or six activity sheets which can be duplicated for students.

The program will be continued in 1982-83.

Southern landscapes

Landscapes: A Guide to the Landforms and Ecology of Southern Saskatchewan is a teaching kit designed to serve as a framework for students studying natural sciences in grades seven through university.

A reference manual written by Professor J. Stan Rowe of the University of Saskatchewan explains the principles of ecology and geology needed to understand landscapes. The manual's theme is earth care. It relates human values and activities to the laws of nature seen in landscapes.

A landscape map, compiled by Agriculture Canada, allows the user to identify each of the landscape types in southern Saskatchewan. These are discussed in audio-visual programs and accompanying printed guides. The guides include suggestions for field activities. A series of full colour posters representing the seven landscapes may be used for demonstrations or classroom displays.

Distribution and marketing of the package began and continued throughout 1981-82.

The Pesticide Tradeoff

This newspaper style tabloid was published and distributed during 1981-82. Articles from newspapers and magazines on pesticide use were collected and reproduced. The articles explore all sides of the pesticide question and include suggestions for further research and study. The publication was very open-ended which encouraged the user to weigh the information provided to make an assessment of pesticide use. Copies of the publication were sent to all high schools, universities, libraries and environmental groups in the province and class sets were made available on request. In addition the publication was written up in many environmental journals resulting in requests for copies from throughout North America and from as far away as Australia.

Cooperative projects

A cooperative program between Saskatchewan Environment and Saskatchewan Education provided for the hiring of an elementary school teacher to develop new materials and activities for environmental education. During 1981-82, these activities were rewritten to a standardized format and organized into four volumes for Division II and III classes. The larger of the four volumes, "Man and the Environment" includes 20 sets of activities designed to supplement the man and the environment theme found in the grade seven science curriculum. The other three volumes, Predator/Prey Relationships, Aerial Photographs and Futuristics are designed as environmental enrichments for grade four, five and six classes. All four volumes will be printed and distributed to Saskatchewan schools during the upcoming year.

New materials/programs

Water, A Teacher's Guide has been completed to accompany the departmental publication Water. Printing and distribution will take place in the upcoming year.

Northern landscapes

Production of a second teaching resource kit, Landscapes: A Guide to the Landforms and Ecology of Northern Saskatchewan, was initiated in 1981-82. The northern kit will follow the same format as its southern predecessor. It will include a reference manual to be written by Dr. J. S. Rowe of the University of Saskatchewan; six slide/tape presentations describing typical terrain categories of northern Saskatchewan; six field guides to accompany the slide presentations and a wall map of Saskatchewan between 50° and 60° latitude to show the main terrain categories and their sub-categories.

Production will continue through the fiscal year 1982-83 with a projected publication date of September, 1984.

Displays

In cooperation with Environment Canada, the department set up a display of its environmental education materials in the Museum of Natural History, Regina, during Environment Week, October 11-17, 1981. Half-hour puppet shows were organized for school students and museum visitors. Displays were also provided at the Saskatchewan Outdoor and Environmental Education Association Conference held at Fort San in February and at its summer workshop in Cypress Hills in August. Sessions were offered and assistance provided in the planning of these two events for environmental educators. In addition, staff of the education division set up displays and conducted environmental education workshops at a number of regional teacher's conferences throughout the province and at the Saskatchewan Teacher's Federation conference in Saskatoon.

Grants

The Saskatchewan Outdoor and Environmental Education Association received a grant of $3,700 to assist with summer workshops in environmental education held at Cypress Hills. The head of the education division served on the planning committee for the workshop. Department staff attended. The department of education shared the cost of a grant of $50,000 to the Prairie Lore and Living Society of Regina. The money will help to finance Saskairie — an outdoor education centre near Moose Mountain Provincial Park.

Environmental Advisory Council

Under the terms of The Department of the Environment Act, the minister of the environment appointed a 12-member citizen committee to advise on environmental issues. The head of the education division served as the departmental liaison to the council.

Six meetings were held throughout the year and two council members along with the department liaison attended the sixth joint conference of Environmental Advisory Councils from across Canada at Banff, Alberta in June.

A complete account of council activities is contained in the council's own annual report. Copies may be obtained by writing to the department.

Thank You

Our appreciation to many Saskatchewan citizens, employees of provincial, federal and municipal government agencies inside and outside Saskatchewan and those officers and members of associations who have helped us with our work during the year.